

Roosevelt Wild Life Bulletin

VOLUME I, NUMBER 3

OF

The Roosevelt Wild Life Forest Experiment Station

OF

THE NEW YORK STATE COLLEGE OF FORESTRY

AT

SYRACUSE UNIVERSITY



Published Quarterly by the University, Syracuse, New York

Entered at the Post Office at Syracuse as second-class mail matter

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The serial publications of the Roosevelt Wild Life Forest Experiment Station consist of the following:

1. **Roosevelt Wild Life Bulletin.**
2. **Roosevelt Wild Life Annals.**

The *Bulletin* is intended to include papers of general and popular interest on the various phases of forest wild life, and the *Annals* those of a more technical nature or having a less widespread interest.

These publications are edited in cooperation with the College Committee on Publications.

Exchanges are invited.

CHARLES C. ADAMS

Director and Editor

[230]

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* Including only those who have made field investigations and whose reports are now in preparation.

** Resigned as Station Ichthyologist October 1, 1921.

RELATION OF BIRDS TO FORESTS

"The total damage to trees by insect pests is enormous, and several years ago was estimated to exceed \$110,000,000 annually. Not only is the damage extremely large, but the difficulties of directly combating insect pests in forests are so great that man is able to do comparatively little. The services of natural enemies of the destructive insects should therefore be highly appreciated. If they serve to reduce the damage by only a small percentage, the gain to the country is a very large sum. Among these enemies, birds are conspicuous. Their services are well known and have long been acknowledged. No reasons have thus far developed for considering any other group of the natural enemies of forest insects in general, more important than birds."

W. L. McATEE.

American Forestry.

Vol. 21, pp. 681-682; 1915.

"Birds are not only essential to the welfare of the tree, but the tree is necessary to the life of the bird. Consequently, there has been established what is termed 'a balance of life' wherein there is the most delicate adjustment between the tree, the insect, the bird and the sum total of the conditions which go to make up their environment * * * Birds are of value to the forest, however, not only as the destroyers of their insect foes, but the birds with the squirrels, help plant the forest by distributing seeds. The seeds which are encased in a pulpy covering, those of the berry or fruit-bearing trees, are voided unharmed by the birds often at a point far distant from the parent tree, the bird thus acting as their distributor. Acorns, beech-nuts, and chestnuts are frequently dropped or hidden by birds, and the seeds of pines are released and scattered by the birds that seek them in their cones. In short, we believe it can be clearly demonstrated that if we should lose our birds we should also lose our forests."

FRANK M. CHAPMAN.

*Seventh Report N. Y. Forest, Fish and Game
Commission, pp. 117, 120; 1901.*

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RELATION OF MIGRATORY BIRDS TO FORESTS, THE STATE AND THE NATION

"The necessity of the preservation of bird life to the continuance of the life of our national forests, and of the preservation of our agricultural resources or, in other words, the dependence of forest and plant life upon bird life, is thus demonstrated."

LOUIS MARSHALL.

Brief to Supreme Court of the United States,
October Term, 1919, No. 609, p. 41.

"On December 8, 1916, a treaty between the United States and Great Britain was proclaimed by the President. It recited that many species of birds in their annual migrations traversed many parts of the United States and of Canada, that they were of great value as a source of food and in destroying insects injurious to vegetation, but were in danger of extermination through lack of adequate protection. * * * Wild birds are not in the possession of anyone; and possession is the beginning of ownership. The whole foundation of the State's rights is the presence within their jurisdiction of birds that yesterday had not arrived, tomorrow may be in another State, and in a week a thousand miles away.

"Here a national interest of very nearly the first magnitude is involved. It can be protected only by national action in concert with that of another power. The subject matter is only transitorily within the State and has no permanent habitat therein. But for the treaty and the statute there soon might be no birds for any powers to deal with. We see nothing in the Constitution that compels the Government to sit by while a food supply is cut off and the protectors of our forests and our crops are destroyed. It is not sufficient to rely upon the States. * * * We are of opinion that the treaty and statute must be upheld."

JUSTICE HOLMES.

Decree, Supreme Court of the United States,
October Term, No. 609, 1919.



Drawn by Edmund J. Sawyer

PLATE 25. BIRDS OF THE OPEN FIELDS, ALLEGANY STATE PARK

1, 2, Bobolink (male and female).

3, Meadowlark.

4, Barn Swallow.

5, Vesper Sparrow.

6, Savannah Sparrow.

7, 8, Cowbird (male and female).

THE SUMMER BIRDS OF THE ALLEGANY STATE PARK

By ARETAS A. SAUNDERS

*Roosevelt Field Ornithologist,
Roosevelt Wild Life Forest Experiment Station,
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INTRODUCTION

The Allegany State Park is situated in the southwestern part of New York in Cattaraugus County south of the bend of the Allegheny River, and about 75 miles south of Buffalo (map 4). The area ranges from a little over 1,300 to about 2,500 feet in elevation, and consists of rather low mountains naturally wooded to their tops with forests that are mainly of broad-leaf deciduous species (figure 71). The present size of the Park is 7,000 acres, and this will probably be increased to at least 65,000 acres.

While bounded roughly by the river (figure 72) the Park area nowhere touches it, as the Allegany Indian Reservation includes

the land for half a mile on either side of the river. Since all main roads of approach to the Park pass through the Reservation, the birds found within it have also been included in this report. Whenever a species was found only on the Reservation and not in the Park area, mention has been made of that fact.

While the greater part of the Park is wild, forested land, there are numerous settlements both within the area and near the border. Just north of the Park, on the Allegheny River, lies the attractive little city of Salamanca, a center for three railroads, and a point from which all accessible parts of the Park may be reached by either railroad or automobile. On the east side of the Park, in the valley of Tunungwant Creek is the village of Limestone, connected with Salamanca by both the Erie and the Buffalo, Rochester and Pittsburgh Railroads. From this point the Tunungwant Valley, an area of different character than other parts of the Park, Limestone Brook and Rice Brook are accessible; and by the road up Limestone Brook the head of the Red House Valley may be reached. From Salamanca, the Pennsylvania Railroad follows down the Allegheny Valley to stations on the west side of the Park. From Red House on this railroad, good automobile roads lead up the Red House Valley, one of the most scenic parts of the Park, and up Little Red House or Bay State Creek. Farther south on the river is Tunesassa, or Quaker Bridge, as it is known to the railroad, which is central to the valley of Quaker Run (figure 73) and the main area that has already been acquired by the Allegany State Park Commission and opened up for the use of campers and visitors.

In the larger valleys, such as Red House and Quaker Run, are numerous farms, and much land under cultivation (figure 72). The greater part of such land lies in the valley bottoms, where the soil is rich. A few places on the hillsides have been cleared and cultivated and used for pasture, but the majority of the hills remain forested. Nearly all the forested areas have been cut over, and the bulk of the forest is second-growth. In the Big Basin at the head of Stoddard Creek, near the head of Red House Creek, and in a few other scattered areas of small size, the forests are old, mature, and except for the culling of a few trees of the more desirable species, are untouched by the axe.

The purpose of this publication is not solely to furnish a guide that will be helpful to the visitors in the Park in learning the names of the birds they see, and understanding more fully their ways of living; but also to describe the ecological distribution of the birds; to outline a general plan for their preservation in the Park, because of their great recreational and educational value; and to assist in the conservation of the game birds, that the good hunting now to be found in the region may be maintained in the future.

That the abundance of bird life in a given region, the proportionate abundance of each species, and the problems connected with the preservation of each species all depend upon its ecology or relation to its surroundings, is a fact that is none too thoroughly realized. For these reasons, as well as for the fact that it will be helpful to the bird student who wishes to know where to look for

certain birds, I have grouped the species in the main text, in ecological associations, rather than in taxonomical order. Because bird life is directly or indirectly dependent upon other forms of wild life, and primarily upon the vegetation, I have described at some length these associations and the principal kinds of plants found in each. It is of course true that no two species of birds live under exactly the same ecological conditions. Some species grouped in one association occur also in others, not all individuals of the species living under the same conditions. Within the same association, different species live differently, dependent in a different way upon it. Some species depend upon conditions in one association for a nesting site, but obtain their food chiefly within another, the individual living in two or more associations. For these reasons it is often difficult to determine in which association to place a given species, and the grouping is therefore somewhat artificial.

A complete ecological study means a study of each species and its interrelations with various plants, insects, mammals, other birds, and all forms of wild life which constitute its associates and enemies. It also includes food, nesting sites or nesting materials and the complete physical habitat. Such an extensive study is beyond the scope of this work, but the outlining of general bird ecology of the region will serve as a foundation for detailed studies in the future. It is obvious that the abundance of a species in a given region is determined not merely by geographical range but also by the conditions within the association in which it must live, and by the relative abundance of other forms of life in that association which affect it. This makes the study of the ecology of birds of primary importance in working plans for the conservation of bird life.

Within each association I have listed the species in the approximate order of their abundance. This order was determined partly by general observation, and partly by making counts of singing birds along the roads, or at points in the forest. I made allowances for the fact that some species had slackened or ceased singing before my arrival in the region, and that in the case of certain species some individuals cease to sing for long periods, so that all individual males are never completely in song together through the nesting season.

This list is based upon a study of the birds of the region occupying a period from July 3 to August 13, 1921. During this time an effort was made to cover as much of the Park area as possible, and particularly to include areas widely varying in character.

For those who are beginning a study of birds, or who know only a small number of the commonest species, a mere local list is not of great value. For this reason I have included the section on the identification of birds in the field, and the field key. I have not tried to give full and complete descriptions of birds such as might be made from a study of skins or mounted specimens, but have emphasized mainly the field characters of each species. Detailed descriptions are not of great use to the outdoor student as

they often over-emphasize characters that are not apparent in the field, and leave out the points concerning general appearance, habit, and voice that are most useful there. I have attempted to describe songs as accurately as is possible, without actually making definite song records for each species, in the hope that the descriptions will prove of value. These descriptions in most cases are not based on study in the Allegany Park alone, but on investigations in various other localities also. I had had some previous field experience with all the species thus far found in the Park. My former acquaintance with the Mourning Warbler, however, was decidedly meager and did not include its song, while my previous observation of the Cerulean Warbler had been made so long ago that it was now almost like seeing and hearing a new bird.

For the beginner I would suggest that this publication be combined with some good general bird guide, and that no attempt be made to use it alone, since other species besides those listed are likely to be found in the Park. There are numerous good popular bird guides, but I would particularly recommend Chapman's "Handbook of birds of Eastern North America" (1914), or Hoffmann's "Guide to the Birds of New England and Eastern New York" (1904). The former is the most complete and authoritative guide that has been written, and is invaluable to one who intends to take up serious ornithological study. The latter, the work of a close and careful field student, contains many hints on habits, notes, or differences between puzzling species that make it extremely useful in the field. The Reed "Bird Guide, East of the Rockies" (1913) has the advantage of small size, low price, and a colored portrait of each species; but the small size makes it impossible to include much information, and in some copies the colorings are not very accurate. Eaton's "Birds of New York" (1910-1914) will also be found most useful because of the local records and migration dates for various parts of New York State, as well as the excellent and almost complete set of colored plates. This work, however, is too large and heavy for field use.

For beginners I should like also to recommend what Silloway has written on the subject of bird study in his "Guide to the Summer Birds of the Palisades Interstate Park" (1920, pp. 17-22). Job's "How to Study Birds" (1910) is a delightful and most helpful book, especially for the would-be camera-hunter. Forbush's "Useful Birds and their Protection" (1913) leads to an appreciation of the economic value of birds and their role in nature. Those who have developed a deeper interest in bird life and wild life generally, and are concerned about its ultimate fate, will do well to read Adams' "Suggestions for the Management of Wild Life in the Allegany State Park" (1921).

All scientific names of birds and plants occurring in this paper correspond respectively with those in the "A. O. U. Check List of North American Birds" revised to date, and "Gray's Manual of Botany," 1908 edition. The reader is referred to the special list of papers of value to the student of bird life in Allegany Park, on pages 348-349.

PRESERVATION OF BIRD LIFE IN ALLEGANY PARK

Enemies of Birds and the Balance in Nature. In a great recreation area such as the Allegany State Park is destined to be, bird life is a most valuable asset. Birds are useful not only economically as destroyers of forest insects, but also esthetically and from the standpoint of recreation and education. Bird life should therefore be carefully encouraged and protected.

The possibilities with this object in view will include certain constructive lines of work. We can protect birds from enemies that would tend to decrease their numbers. We can attract birds to the Park or to camps or summer homes by making conditions favorable, and to a limited extent we may increase their numbers. In the development of the Park we can avoid the many procedures which would tend to decrease and discourage bird life, however unintentional such a result might be.

In the protection of birds we may place their enemies in two classes: the wild, natural enemies, and those enemies for which man is responsible. The wild and natural enemies of birds have long existed within the Park area. These consist of various mammals such as the weasels, mink, fox, lynx, skunk and squirrels; birds themselves, including hawks, owls, jays, crows, and even smaller forms such as the Red-headed Woodpecker, Cowbird and House Wren; snakes; and probably parasitic forms among insects and worms. In considering these enemies, we must realize the existence of what has been termed the balance of nature. Each kind of animal has its own struggle for existence. It must obtain food, escape its enemies and reproduce its kind. In this struggle it depends upon other forms of wild life which furnish in one way or another food and shelter, and in the case of birds, nesting sites and nesting materials. In this same struggle its enemies must prey upon it, annually decreasing its numbers to nearly the same extent that it increases them by reproduction. Each species is dependent upon its associates in one way or another, and these species in turn upon still others. The interrelations between different forms are therefore exceedingly intricate. The decrease or increase of the numbers of any one species causes a corresponding increase or decrease in some other species, and that in turn of a third. When man, through wholesale destruction of some species supposedly harmful to him, disturbs this natural balance he may not merely decrease the harmful kind, but tend to increase some other much more harmful, or decrease some beneficial species. It is probable that the outbreaks of harmful insects in vast and almost uncontrollable numbers might be traced back, if we understood the interrelation of forms of life, to some disturbance of nature's balance by man.

Further than this, the wild enemies of birds weed out from their ranks the weaker individuals, those less fitted for the struggle for existence. If through destruction of these enemies, the weaker ones increase, disease or parasitic enemies may start, and spread from weaker to stronger and do far more to decrease bird life than other natural enemies ever would.

Wild enemies of birds include not only many birds themselves but also other desirable forms of wild life that have a distinct educational and recreational value. The sentiment that condemns every form of wild life which preys upon song birds, calling it blood-thirsty and cruel when it is merely living its life as nature taught it to live, is wrong and misplaced. Is not the Robin, when it preys upon the earth-worm, quite as cruel and blood-thirsty as the Sharp-shinned Hawk when it preys upon the Robin?

For these reasons many efforts to destroy the wild enemies of birds are ill-advised (cf. Forbush, '13). In the administration of the Allegany State Park it will be wise to make an effort to keep wild life in a natural balance, without exterminating any one species because it is an enemy of some other that may seem more desirable, except in the areas set aside wholly for fishing and hunting. Enemies of birds in the Park, other than the native forms of wild life, are man, the cat, the dog, the European Starling and English Sparrow. There are probably others, but these are the most important. Man is responsible for all of the introduced species, and to a certain extent able to control them.

Control of Enemies of Birds. In controlling man two methods are useful: legislation and education. Legislation for general protection of birds already exists in the form of good State and Federal Laws. There may be occasion, however, for special legislation protecting all forms of life on certain areas, or prohibiting hunting within areas set aside as game preserves. The character of the majority of visitors to the State Park will undoubtedly be such that the usual routine of law enforcement to protect bird life will be all that is necessary. The few cases that may arise through either malicious intent or ignorance of the law should be dealt with in such a way as to discourage further cases. Park visitors and campers who desire to help can exercise a good influence if, when they meet with those who are ignorant of the laws and purposes of the Park, or who may be inclined to destroy wild life, they make a point to inform such persons of the value of such animals in the Park. Educational measures may be taken in many ways, such as the posting of signs at appropriate places in the Park, the publication and distribution of pamphlets, the printing of articles in newspapers and magazines, and the employment of nature guides.

The cat is fully as destructive to bird life as the worst of wild enemies. Unlike the latter it has not the same struggle for existence. It depends upon man to feed and shelter it. If it cannot succeed in catching prey there is ordinarily no danger that it will starve. It need not face the cold and hunger of winter that wild creatures endure. Without these forces to keep its numbers in check and with no diminution of its hunting instincts it becomes a greater menace to bird life than all the wild natural enemies. Cats should therefore be discouraged in the Park. There are possibilities of good legislation to control them in the future; but aside from this it is recommended that campers or those who lease summer

home sites within the Park be not allowed to bring in or keep cats (cf. Forbush, '16).

The dog is less harmful to bird life than the cat, and more easily controlled. Dogs running at large often destroy birds and ground nests as well as small mammals and other forms of wild life. Dogs should not be allowed to run loose in the Park except when used for hunting during the regular hunting season.

The English Sparrow and the Starling are not enemies in that they prey upon other birds, but in that they annoy and drive out native species, upsetting the natural balance. The question of the economic status of these two birds is a difficult one, both of them being at times valuable insect destroyers, and at other times harmful in food habits. It is not probable that they directly drive off all native birds, as has been charged, but they displace hole-nesting species such as the Bluebird and Flicker. Were there no English Sparrows in the Park it would not be difficult to get nesting colonies of the beautiful Purple Martin. When the Starling increases in the region, as it pretty certainly will, Bluebirds and Flickers will be liable to decrease.

Nor is the question entirely one of nesting sites. These introduced species undoubtedly get food that other species depend upon. The Starling, particularly, is almost omnivorous, eating insects, fruits and seeds. Its flocks will often get large quantities of wild fruit that other species such as the Cedar Waxwing, Robin and Catbird have more or less depended upon. In open fields it probably gets both insects and seeds that have formerly been food for Bobolinks, Meadowlarks, Red-winged Blackbirds and others. Just how these birds are to be combated is a complicated and difficult question, but certainly no protection and every means of discouragement should be used in the State Park. Any practicable means of getting rid of them that may present itself in the future and seem to promise success should be tried.

Methods of Attracting and Increasing Birds. The problem of attracting birds to the Park in general, is hardly necessary to consider, as birds are already there in about natural numbers. The question of attracting particular species, however, or of enticing birds about camp sites and summer homes, may well be considered.

There are four principal things that can be done to attract birds. These are the placing of bird houses for hole-nesting species; the constructing of drinking and bathing places; winter feeding; and the planting of trees, shrubs or vines particularly attractive to birds.

There are nine species now known to nest in the Park that are desirable and could be attracted about camp sites by the placing of nesting boxes in suitable situations. These species are the Bluebird, Robin, Chickadee, Nuthatch, House Wren, Crested Flycatcher, Flicker, Screech Owl and Sparrow Hawk. The English Sparrow and Starling will also occupy bird boxes in their favorite localities, but should not be allowed to do so. The Purple Martin, while not included in this list, is reported to occur occasionally in Salamanca. There seems reason to believe that colonies could be

established in the Park by erection of the proper kind of bird houses in the more favorable localities. It would seem as though other species of swallows could be attracted by the erection of special structures similar to those they commonly use for nesting, but I have never heard of this being tried. It might also be possible to attract such a species as the Wood Duck.

The setting up of bird boxes should be undertaken by someone well acquainted with the subject and with the preferences of the species to be attracted. Artistic looking but wrongly constructed boxes will not meet with success. The placing of a box for a certain species in the wrong locality will be equally bad. Chickadees and Nuthatches prefer the forest. Bluebirds, Robins, Wrens and Crested Flycatchers like the more open orchards. Martin boxes should be placed only in the open and not under trees. The size of the box and its opening will depend upon the species to be attracted. The Robin will not occupy the ordinary box with a small hole for entrance, but wants simply a floor and a roof, with one or more sides entirely open.

There are many cases of city parks or private estates where bird boxes have been set up without any special study of the subject, with the result that very few are occupied, or are mainly tenanted by squirrels, English Sparrows or Starlings. It may be desirable to furnish houses for squirrels also, but the matter should be handled with such care that those meant for birds should not be occupied by the squirrels.

Drinking and bathing dishes are a great attraction to birds on hot summer days; and they are a successful means of bringing many species to the vicinity of camps or homes where they may be easily observed. Almost all song birds bathe or drink at times. Even near streams and lakes birds like small drinking and bathing places and are attracted by them.

A few points should be observed concerning the drinking and bathing dish. Different depths seem to attract different species; and a bath with a gently sloping bottom, providing different depths at different points along its length, would probably be most successful for the greatest number of species. The height of the rim above the water, where birds may perch to drink, is also important. Placing large flat stones in the water, so that they come just above its surface, will be found an attraction. The water should be fresh, and not allowed to evaporate wholly. Probably interested children or other campers could be prevailed upon to keep the dish well supplied through the camping season. Provision for a constant supply of running water is desirable where such a thing is easily possible.

Feeding of birds is best accomplished in winter when food is scarce and birds are at times in danger of starvation. In summer, when food is abundant, it is better to leave the birds to gather their own natural foods, that they may be of greatest benefit to forests or farms. Since the Park will be visited mainly in summer, and the winter birds will be largely different species or individuals than the summer ones, it may not be convenient or desirable to conduct win-

ter feeding, except perhaps with game birds, species that are given special consideration on pages 249-253 of this report.

The fourth method of attracting birds, by the planting of trees, shrubs or vines, is not particularly necessary in the Park, except in special places, because it is already well supplied with native species that are attractive. There are a few favorite kinds with particularly attractive fruits that are native but not abundant in the region, and these could probably be planted successfully. They include the red mulberry (*Morus rubra*), a great attraction to summer birds; the high-bush cranberry (*Viburnum Opulus*); the mountain ash (*Sorbus americana*); and others. These are examples of trees and shrubs that would undoubtedly be a lure to many birds, inducing some to linger in certain localities and perhaps remain over winter; but they would probably not noticeably increase bird life in the Park.

Preservation of Natural Conditions in Parks. While the various methods of attracting birds may be practiced with benefit, it is of greater importance that the present conditions, which already make the Park very alluring to birds, should not be greatly changed (cf. Adams, '21). Often in city parks, authorities interested in attracting birds set up bird boxes and drinking fountains, feed the birds in winter, and plant favorite food plants; but all of these efforts are offset by the fact that in making roads, drives, paths, picnic grounds, etc., natural conditions are destroyed, and bird life is less abundant than when the region was wild. In the development of the Allegany Park this can be avoided. The various uses to which the Park is to be put must all be kept in mind and coordinated, so that activities to create one result will not seriously interfere with those that have other objects in view. The area of the Park is ample for the construction of roads and trails, picnic and camping grounds, and for providing leased summer home sites without interfering with bird life.

While there are nine species of birds in the Park that will occupy bird boxes if erected, there are at least eighteen species that depend upon low, thick bushes for nesting sites, and many more that often use such places as a protection from natural enemies. The preservation of shrubbery, particularly thick, thorny bushes or tangles of vines, is of great importance.

It is noticeable that most birds prefer open areas, edges of woods, or thick bushes that grow in good-sized clumps with open spaces between, rather than dense growths of large area. The creation of roads, trails and camp sites will in this respect make conditions more favorable to bird life, so long as the intervening shrubbery is not removed. These principles should be kept in mind in developing the Park, and making all parts of it more accessible to visitors. No unnecessary removal of undergrowth and thickets with the idea of making things "ship-shape" and park-like should be allowed. To most people the natural growth is really more beautiful than open, formal groves of trees, or roadsides bare of bushes and vines.

Many species of wild trees, bushes and plants that now grow naturally in the Park bear fruits that are eaten by birds. Among these are the black, red and choke cherries (*Prunus scrotina*, *P. pennsylvanica*, and *P. virginiana*), the virginia creeper (*Psedera quinquefolia*), the river grape (*Vitis vulpina*), the sumacs (*Rhus typhina* and *glabra*), the poison ivy (*Rhus toxicodendron*), the shad bush (*Amelanchier canadensis*), the white thorns (*Crataegus coccinea* and *Crus-galli*), the flowering, alternate-leaved, and silky dogwoods (*Cornus florida*, *C. alternifolia* and *C. Amomum*), the several species of raspberries and blackberries (*Rubus*), the viburnums (*V. acerifolium*, *V. alnifolium* and *V. dentatum*), the elder (*Sambucus canadensis*), the pokeweed (*Phytolacca decandra*), and the purple nightshade (*Solanum Dulcamara*). With the exception of the poison ivy and the nightshade, there is no reason for removing any of these plants except where roads, trails, camp sites and similar improvements are to be constructed. Other wild plants are attractive in a number of ways. The thistles furnish food and nesting materials for Goldfinches. The bee balm (*Monarda didyma*) and the cardinal flower (*Lobelia cardinalis*) are special favorites of the Hummingbird. Many grasses and weeds furnish food for the seed-eaters in fall and winter. This is also true of alder, birch, ash, tulip and hemlock among the shrubs and trees. Most of these various plants, being objects of beauty when in flower or fruit, are useful for other reasons than their relations to birds.

In the forest the old dead stumps and trunks of trees furnish nesting sites for the Woodpeckers, Nuthatches and Chickadees. Their complete removal might mean the elimination of these resident birds. In the practice of forestry it is customary to remove all such debris because it is supposedly a fire menace and a breeding place for destructive fungi and insects; yet I question the wisdom of such a policy, particularly in the Allegany Park where the practice of forestry must be coordinated with recreational and educational uses. Moreover, under normal forest conditions, the birds are the chief factor in the control of injurious insects.

From the purely economic standpoint, the Woodpeckers are the chief enemies of wood-boring insects and bark beetles. Their elimination would certainly result in an increase of these destructive insects. Only one Woodpecker, the Flicker, can be induced to nest in artificial bird boxes erected for it. The others must drill out their own homes in a dead stub or limb. The Flicker, since ants comprise a large part of its food, cannot be so great a destroyer of borers as the Downy and Hairy Woodpeckers. The removal of dead trees and limbs to any great extent would be certain to decrease or altogether eliminate the latter birds.

In the same way, the removal of old logs, stumps and windfalls with upturned roots would be likely to eliminate the Winter Wren, one of the most interesting birds and sweetest of singers in the Park. The removal of small dead birch stubs would destroy the

chief nesting sites of the Chickadees, birds which from both the economic and esthetic standpoints we cannot afford to lose.

Further than this the fire danger is not so great in the Allegany Park as in a coniferous forest. There are no signs of great destruction by fires in the past. Forest fires have occurred, as many fire-scarred trees and stumps show, but the forest floor, with its humus and splendid reproduction of woody plants, indicates that they have done but little damage. The area will be well intersected with roads and trails, and any fire that starts can be easily reached and extinguished in a comparatively short time.

Fungi, of course, will develop in old stumps and logs, and such fungi are now abundant in the region. But a fungus that starts in a dead log or stump is rarely if ever truly parasitic, or the primary cause of the death of a living tree. Species of such genera as *Pleurotus*, *Polyporus*, *Fistulina*, *Pholiota* and *Volvaria* grow on both living and dead trees, but when on living trees they grow only on dead portions that have been injured by some other cause. The most destructive parasitic fungi, such as the chestnut disease (*Endothia parasitica*), the white pine blister rust (*Peridermium Strobi*), and *Trametes pini*, do not normally start or develop in dead logs or trees, but on living ones. They may occasionally, however, persist on a tree they have killed, fruit there, and re-infect living trees. This danger is so slight as not to justify cleaning a Park area of all dead trees and stumps, if thereby valuable forest birds are driven away.

The practice of forestry within large recreational areas is desirable. Yet there are many nature lovers who are antagonistic to such an idea. There is opportunity in the Allegany Park to show that forestry can be practiced without destroying many of the natural conditions of the forest. Certain parts of the Park should be preserved wholly in the wild state. Thus we may use the Park as an example to the rest of the State and the entire nation where forestry, recreation and the preservation of wild life can all be developed harmoniously.

GAME BIRDS OF THE PARK AND THEIR FUTURE

Only two native species of game birds are known to breed within the Park. These are the Ruffed Grouse, known locally as Partridge, and the Woodcock. The first is quite common, and the second, while not common, is widely distributed. Both are reported to occur in fewer numbers than in former years, but both are more frequently seen here than has been my experience in any other part of eastern United States in the past fifteen years.

One or more species of Pheasant (*Phasianus*) is reported as having been introduced in various parts of the Park area, but I saw none. A small flock are reported this year in the Tunungwant Valley near Limestone, and others have been liberated in the Red House Valley, and perhaps other places. How successful their

introduction is likely to be, it is hard to say. I would strongly advise, however, that *only native species* be encouraged in the Park.

The Bob-white or Quail (*Colinus virginianus*) seems to be unknown in the region, not only now but also in the past. Probably the winters are too severe and the snow too deep for them to survive here. Wild Turkeys doubtless occurred many years ago. Ducks occur in suitable places, and some may breed within the Park. Good duck hunting is sometimes to be had in the Tunungwant Valley, near Limestone, particularly in years when there are heavy rains that increase the pools and bayous, but in other parts of the Park the occurrence of ducks is only casual.

Efforts should be made to conserve game birds in the Park, not only because of their educational interest, but also in order to insure good hunting there always. Probably the most effectual thing that can be done to accomplish this is the setting aside of one or more central areas as game refuges where no hunting at any time should be allowed. In other specified parts of the Park hunting under proper legal restrictions should be allowed and encouraged, as it is one of the uses for which the Park was created. (For a discussion of management of the wild life of the Park, see Adams, '21.)

The boundaries of the game refuge area should be well marked, and fenced with a single wire, not barbed. Any other sort of fence is unnecessary and liable to be harmful to game. Ruffed Grouse, in the fall, frequently fly about wildly where flocks are scattering and often kill themselves by flying against wires. In other regions, where areas have been fenced with a fine-mesh wire fence, supposedly cat- and dog-proof, many Grouse and some Woodcocks have been killed and injured by striking the fence. On such areas game birds have been greatly reduced in numbers by this cause.

The Park regulations regarding game should be strictly enforced. The majority of hunters will respect the laws, knowing that they are for their own good. It is not unlikely that a few will break laws when they can, particularly the law that prescribes the maximum number of birds that may be taken in a day or season. However, a few convictions with severe penalties will serve as a check for such disregard of law.

The use of the automobile in hunting has a bad effect in most regions. Hunters go from one good area to another with the machine, covering a larger territory in a day, and keeping their dogs always fresh. Complaint is made that this practice has been combined with a disregard of the daily bag limit, with decidedly bad results. The use of an automobile to reach the Park for a hunting trip is not objectionable, but its use in going from place to place there for the purpose of covering a greater area in a day should be restricted if it tends to result in depletion of game or other unfavorable features.

The aim should be to keep the game birds of the region always in normal numbers, and to allow only so much hunting as will offset their natural annual increase. If this can be done successfully there will always be good hunting in the Park. If it cannot, game birds

will decrease continually until it becomes necessary to stop hunting altogether.

To insure continual good hunting it should be part of the duties of some officials employed in the Park to keep careful watch of the relative abundance of game, and to report regularly to the Park Commission as to how the birds have withstood the hunting season and the winter, and how successfully they have reared young in early summer. Provision should be made by which the Park Commission should be empowered to stop all hunting for a year or two in case the numbers of birds has been greatly depleted through failure of food supply, too intensive hunting, or severe weather conditions.

Ruffed Grouse seem able to care for themselves through the winter, no matter how deep the snow or severe the cold. There will probably be no necessity of feeding them or taking special care of them through that season. The great numbers of deaths in winter are more likely to be due to natural enemies. The carnivorous mammals that are active through the winter and that prey upon Grouse when they have opportunity are not numerous in the Park and will probably not be a serious danger to game. The enemies that may cause considerable depletion in numbers are the Goshawks and Horned Owls that in certain years invade more southern regions from the north, probably only when the food supply there is scarce. These birds are also liable to affect the numbers of small game mammals such as the varying hare. The time of their invasions should be carefully observed. Correspondence with field ornithologists in different parts of the country will reveal the coming southward of such birds. In case of necessity it may be advisable to employ a hunter in such years to decrease these predacious birds, particularly within the game preserve areas.

The question of other natural enemies of game is not particularly serious. The balance of nature, discussed elsewhere, applies here, and it must be remembered that extermination of the fox, lynx, skunk, mink or weasel may result in some unforeseen condition that in the end would be more harmful than beneficial to game and other wild life of the Park.

The introduction of other species of game birds to the Park area deserves consideration. As has been said, the Bob-white or Quail seems never to have been native in the region, probably because the winters are too severe and snow too deep. This bird must have grain or seed foods, and grit with which to digest them; and deep snows, particularly crusted snows, often decrease their numbers in regions where they are native. They could probably not be introduced successfully unless provision were made to feed and care for them through the winters, involving considerable expense. Attempts to introduce this species seem therefore inadvisable.

Pheasants and other foreign species may perhaps be successfully introduced. It must be remembered, however, that the introduction of a foreign species in numbers enough to make good hunting will

cause a change in the balance of nature, and will affect some native forms of wild life. This adverse effect will likely apply to the Ruffed Grouse itself, and the question will then be as to which species is more desirable, the native Ruffed Grouse, or the foreign Pheasant. The Pheasant is a beautiful and interesting bird, but it is doubtful if its shooting affords as much real sport as the Ruffed Grouse. The real sportsman measures his success more by the difficulties he has overcome and intricate shots he has accomplished successfully than by the size of his game or the number secured. It would be better, therefore, to put time, money and effort into protecting and conserving the native Ruffed Grouse, than in introducing the foreign Pheasant or other exotic species.

While there is good ground for objection to the introduction of foreign game birds, there ought to be none to the introduction of species formerly native in the region. The Wild Turkey undoubtedly occurred here many years ago. I am not aware that any attempt has ever been made to introduce this species as a game bird in regions where it was formerly common. It is now rare in most regions to which it was indigenous, and perhaps is in danger of extermination. Its preservation for the future should be of as much value and interest as the preservation of bison and elk. It might be difficult, and undoubtedly would be expensive, to obtain a stock of these birds. The stock should be obtained from a region as nearly like the Park as possible, one where there are deep snows in winter, that the birds may be accustomed to living through a hard season. Perhaps such conditions will be found in the higher parts of the southern Appalachians. The birds should of course not be hunted for many years, or until their introduction has proved wholly successful. The food habits of the Wild Turkey should be studied, particularly through the winter, and the birds fed when necessary during the first few years at least. There is as much reason to expect the introduction of this bird to be successful as that of the Pheasant; and to the American nature lover its re-establishment in its former haunts should be of great interest and a source of just pride.

The formation of lakes in the Park, aside from their many other attractive features, will undoubtedly increase water birds, and it is quite possible that some duck hunting will be available where there is now none. Many migratory species of ducks, Canada Geese, and even occasional swans are reported to occur along the Allegheny River in the fall. Lakes will invite these birds to stop during migration. Water plants and aquatic life that will furnish food for these birds should be encouraged, and perhaps introduced if they do not establish themselves naturally.

With the creation of lakes and ponds it would seem quite possible to establish the Black Duck, and perhaps the Mallard, Blue-winged Teal and Wood Duck as breeding birds in the Park. For such a result the lakes must not be too much of the artificial reservoir type, but the growth about their shores of natural grasses, sedges, and swamp-loving shrubbery and plants should be encouraged. Leaving

a few dead, hollow trees or stumps, or the erecting of artificial substitutes for nesting sites would be likely to attract the beautiful Wood Ducks.

In considering this matter it might be advisable to locate the wild life and game preserves in places where lakes can be created, and plan for the construction of such lakes. This will protect not only ducks and water birds that may breed, but also give the migratory species a place to tarry unmolested, increase the numbers that will habitually stop in the region, and make good hunting each fall on lakes where shooting is allowed.

WHEN AND WHERE TO STUDY BIRDS IN THE PARK

One who visits the Allegany Park with a study of its birds as one of his objects will do well to go early in the summer. Most birds are nesting and singing in June and early July, and are easily observed then. By the middle of July several species have ceased to sing. Fewer and fewer songs are heard as the summer advances, until by mid-August nearly all birds are silent. The number of bird species seen is likely to be much greater in June and July than later in the summer.

In late summer many birds moult, acquiring the plumage of fall and winter, which is often dull and not so distinctive as the breeding plumage. Large numbers of young birds in plain but puzzling plumages are to be found then. These facts make identification of birds at that season a matter of considerable difficulty, until one becomes skilled through long practice. The chapters on Identifying Birds in the Field and the Field Key (pages 334-345) give ample guidance for the amateur and should enable anyone to distinguish and become well acquainted with most of the Park birds in a reasonable time. However, identification is only one of several aspects of this pastime; the interesting habits of birds and their ever attractive manners make them extremely fascinating at all seasons.

The best time of day to look for birds is in the morning, the earlier the better. Birds begin their day with the first faint light of dawn, and are most active in the early hours following. Near noon they are inactive and silent, as a rule. The expedition that waits till nine or ten o'clock to go out into the field will find comparatively few birds. There is another period of bird activity toward evening. One may often be quite successful in finding birds in the last hours of daylight; and as twilight deepens such night-calling species as the Whip-poor-will and owls become vocal.

Trips into the field to look for birds are best made on foot and in small parties of two or three persons. The automobile may be useful in getting from one locality to another, but one will see few birds that can easily be identified from a moving car. Walking is greatly to be preferred; not the rapid hike that covers as much ground as possible in a given time, but slow sauntering, stopping wherever the beauties of nature invite one to tarry. Often one who saunters over a small area finds as many birds as one who covers

many miles, and nearly always acquires a more intimate acquaintance with the birds he has seen. Furthermore, walking out of doors, especially with a definite object in view, is the best of healthful exercises.

The number of birds seen on a trip is usually in inverse ratio to the number of persons in the party. If too many wish to go on a trip it is better to divide into two or more small groups, going by different routes. A person will see the most birds when alone, although in some cases two pairs of eyes or ears are better than one. Quick motions, loud conversation or laughter, and sudden exclamations, all tend to keep the birds away from the party and lessen the opportunity to use one's eyes and ears to locate them.

A field glass of some sort is almost indispensable in observing birds, particularly for the beginner. The glass brings out the slight details of shape or plumage that are so necessary in making the more difficult identifications. An opera glass is good, but a glass of higher power is better. Most observers prefer, for ordinary field work, a prism glass of six or eight diameters. Higher power than this can be used for water birds along a seacoast or large lake, but ordinarily is not necessary. The higher the power the more difficult it is to hold the glass steadily on the object in view. For this reason many prefer six diameter glasses to eight.

One who wishes to do serious work should have a note-book for descriptions of new birds to be written on the spot. Not only descriptions, but notes on habits, song, associations and other facts will prove interesting and valuable, and most pleasant winter reading withal. One should never neglect a given species of bird because he already has seen it satisfactorily and has its name on his list. The test is not how many birds you have seen, but how many birds you know intimately. The possibilities of observing something new about even our commonest birds are never exhausted. And with each returning spring there is ever fresh interest in even the plainest birds and the most familiar songs.

In Allegany Park the birds are to be found almost anywhere. Wherever natural conditions have not been greatly changed this is especially true. As a rule birds are more abundant near water than on high ridges at a long distance from streams or lakes; and in general, are more frequently met with in the open or about the edges of forests than in the midst of dense woods. Areas near civilization where too much underbrush has been removed, park-like groves of trees without shrubbery, will never have many birds. Except for these general rules there are no special places where birds abound in preference to all other localities, but one should find birds almost anywhere that he looks for them. Local weather conditions or local abundance of food supply may cause birds to congregate in one locality for a day or two, but these conditions do not last, and cannot certainly be foretold.

A knowledge of localities, however, will help us to find certain species that we wish to see. These may have decided preferences as to habitat, governed by either the character of their food or of their

nesting sites. For this reason I have grouped the birds in the following chapters according to such favorite haunts. The observer will soon notice that certain birds are almost invariably associated, or always in a certain distinct environment, so that if one describes the place where a bird was found, that often forms a good clue to later identification. The best-known birds are those living about orchards, meadows or buildings, in the vicinity of man. They are less shy than other birds, and more easily observed. The beginner may start with these first, and as he gradually develops an intimate acquaintance with them he will enlarge the circle of his wanderings to the upland thickets, the stream valleys, and finally to the forest. In the thick tops of the forest trees observation is more difficult. The bird often hides itself most tantalizingly behind a screen of dense foliage. The rarer warblers flit incessantly, giving but brief glimpses of their brilliant colors. When the student finally has come to know not only the common birds of orchard and meadow, but also those rarer gems of the forest, he has developed a skill and enthusiasm in bird study that will lead him joyously to the wildest haunts in all weathers.

BIRDS OF ORCHARDS AND SHADE TREES

Many birds that live in or about trees prefer those that stand alone with open country about them, rather than trees in a forest. For this reason certain birds occur mainly in orchards or in and about scattered shade trees along roadsides. Most of these will be looked for in vain in forests, for the trees are too close together and the cover too dense for their liking.

Apple orchards (figure 74) are common in the Park, and about farms and along roadsides many large shade trees have been either planted or left from the original forest. Sugar maples (*Acer saccharum*) are the commonest shade trees, but there are also elms (*Ulmus americana*), red and silver maples (*Acer rubrum* and *A. saccharinum*), white and red oaks (*Quercus alba* and *Q. rubra*), butternuts (*Juglans cinerea*), basswoods (*Tilia americana*), shag-bark and pignut hickories (*Hicoria ovata* and *H. glabra*), Norway and black spruces (*Picea excelsa* and *P. mariana*), and scattered individuals of other species.

About these scattered trees the vegetation is mainly that of the meadows and open fields, though some grasses or plants that grow well in the shade, such as orchard grass (*Dactylis glomerata*), are in greater abundance than others.

In addition to the birds here listed as living in such localities the following species may also be found in summer in orchards or about shade trees: Mourning Dove, Sparrow Hawk, Ruby-throated Hummingbird, Phoebe, Blue Jay, Crow, Starling, English Sparrow, Red-eyed Vireo, Yellow-throated Vireo, Redstart, House Wren, White-breasted Nuthatch and Chickadee.

ROBIN. *Planesticus migratorius migratorius* (Linn.)

The Robin is so common and well known that a description of the bird would seem hardly necessary. Yet I have found that few people can describe a Robin correctly. The bird is about ten inches long, gray on the upper parts, becoming almost black on head and tail, particularly in the male. The throat is streaked black and white, and the breast a brownish red. The under parts are white, and the outer tail feathers tipped with white. Young birds have breasts spotted like those of the true thrushes, and backs streaked with whitish.

Robins are abundant in the Park, as they are in this general northern region. They are found in orchards and about buildings, but are seldom met with in the forest, particularly in the denser parts. While this species is common, I believe it is by no means the commonest bird of the Park, as at least three others, the Song Sparrow, Red-eyed Vireo and Indigo Bunting, exceed it in abundance.

The song of the Robin is a lively, sweet carol, made up of short phrases of two or three notes each. In the early morning the bird sings these phrases rapidly, one after the other, without pause sometimes for as much as fifteen minutes at a time. When singing later in the day there are not only short pauses between the phrases, but the phrases themselves are grouped together in fours and fives, with longer pauses between the groups.

The nest of the Robin is placed in a great variety of locations. The bird prefers a broad, nearly flat surface on which to place the nest, and also likes shelter from above. In a tree, a broad flat limb or fork of rather large limbs is commonly chosen. The bird likes to make its home about buildings, placing the nest on rafters or beams, or under piazzas, roofs or bridges. The nest is made of mud and grasses, and the eggs are light greenish blue in color, well known to every dweller in the country.

KINGBIRD. *Tyrannus tyrannus* (Linn.)

The Kingbird is a little smaller than the Robin, with dark gray upper parts, the head almost black, the tail black with a broad white band across the end, and the under parts pure white. The white tail band is the best field mark, as no other bird has the tail marked just this way. On the crown of the head is a patch of orange, concealed under the dark gray tips of the feathers, but, despite the colored plates that always make this mark prominent, it rarely shows in a living bird.

The Kingbird is common in the Park, occurring about orchards and shade trees, wherever there is open country, with scattered trees, posts or wires to serve as vantage points. It perches in a conspicuous place near the top of a tree, whence it darts out and snaps up the flying insects that pass, or gives chase to a Crow or Hawk that comes too near. In the latter case the larger bird always retreats, for the Kingbird will fly above it, and repeatedly dashing downward, peck feathers from its back, or even alight on its back and ride a little way if it has the opportunity.



Fig. 71. Quaker Run Valley; showing tree-tops in foreground, with edge of meadows, upland pastures and forested slopes in the distance.



Fig. 72. Allegheny River, near Tunesassa. Frequented by the Spotted Sandpiper, Killdeer, Kingfisher, Great Blue Heron, and occasionally Black Ducks, Herring Gulls and Bald Eagles. Mountains of State Park in the distance.



Fig. 73. View across Quaker Run and up Cain Run valley, showing a great variety of bird haunts. Pasture and stream margin trees in foreground, tilled fields and orchards beyond, and unbroken forest on the heights.



Fig. 74. An apple orchard, where such familiar birds as the Robin, Bluebird, Kingbird, Chipping Sparrow, Flicker and Downy Woodpecker are sure to be found.

The Kingbird's voice is high-pitched and harsh. It has no song, but its commonest notes sound like "keep-keep-kip kipa kipa kipa kip," emitted rapidly. The nest is built in a tree, preferably an apple tree in an orchard or a shade tree overhanging a stream. One or both parents are usually perched near the nest, guarding it from all intruders. The eggs are a beautiful creamy white, with rather large, elongated spots of reddish brown and lilac.

CHIPPING SPARROW. *Spizella passerina passerina* (Bech.)

This bird is smaller than the English Sparrow. The top of the head is bright chestnut or reddish brown, bordered by white lines over the eyes and black lines through them. The back is grayish brown streaked with black, with bars in the wings, and the under parts are light gray without marks. Young birds lack the bright crown and are striped on the breast.

The Chipping Sparrow is a common bird in the orchards and scattered shade trees of the Park. It is often an exceedingly tame and familiar little bird. It may occur about the edges of the more open forest, but is unknown in dense woods.

The song is a simple trill of rather unmusical quality. It varies in individuals mostly in time, some songs being slow enough to count the separate notes easily, but others so rapid that these notes cannot be counted. The song is usually all on one pitch, but occasionally there is a slight rise or fall.

The nest is placed in a tree, bush or vine, often in the tangle of a porch trellis. It is made of small twigs and grasses, and lined with horsehair. The blue eggs are marked with blackish spots near the larger end.

GOLDFINCH. *Astragalinus tristis tristis* (Linn.)

This little bird is smaller than the English Sparrow. The male is brilliant yellow, except the wings, tail and top of the head, which are black. There is a bar of white in the wing and a few white tips on the tail feathers. The bill is bright orange. The female is dull olive color, somewhat yellowish beneath and with prominent wing bars.

The Goldfinch is abundant in the Park, inhabiting orchards and shade trees, and in smaller numbers the margins of thickets. The birds may be seen in small flocks in early summer and in pairs later. They feed commonly on seeds of the canada thistle, dandelion and other plants of the composite family. They fly from place to place with a distinctly undulating flight.

The song of the Goldfinch is bright, pleasing and canary-like. It is quite varied, a single bird commonly singing a dozen or more different variations, one after another. In spring the birds sing together in flocks, but this is not a common habit in summer. The song season continues well into August, when most other species have ceased to sing. The call notes are "cher-wichery, cher-wichery," given with each undulation in flight, and "swee-see-ee" with an upward inflection to the second note. Both these calls are frequently interpolated in the song.

Goldfinches are late home builders, seldom starting before July. The nest is placed in a tree or bush, the bird showing a preference for maples. It is a cup-shaped structure, largely made of thistle down. The eggs are very pale blue or nearly white.

BLUEBIRD. *Sialia sialis sialis* (Linn.)

The male of this beautiful bird, which is a little smaller than the Robin, is brilliant blue on the upper parts and reddish brown on the throat and breast, shading to white beneath. The female is duller, grayer blue, and lighter reddish brown on the breast. Young birds are gray, with a glint of blue in the wings, the upper parts streaked with whitish and the breast spotted with brown.

The Bluebird is quite common in the more open portions of the Park, about farm lands, orchards, shade trees and buildings. It may be observed sitting on wires, posts or open perches along the roads, when the curious manner in which it hunches its shoulders, as it watches the ground, will identify it as readily as its plumage.

The voice of the Bluebird is soft, low-pitched and sweet. The common call note, which has been written "surely" or "truly" but is perhaps more accurately "oahloo," is as sweet as the song. The latter is a longer, more varied performance, sung mainly in early spring and only occasionally in the early summer months. "Eco-ah loo-ee," with a sweet, upward inflection on the last note, will represent one of the commonest phrases.

The nest of the Bluebird is placed in a hole in a tree, stump or fencepost, or in a bird box provided for it. It is a bird that could be easily attracted about the farms or the more open camp sites of the Park by the erection of such boxes or suitable nesting holes. The nest is made of grasses and hair, and the four to six eggs are very light blue, without marks.

BALTIMORE ORIOLE. *Icterus galbula* (Linn.)

This beautiful bird, a little larger than the English Sparrow, is colored a brilliant orange and black. The head, neck, throat, upper back, wings and tail are black. The breast, under parts, lower back and shoulders are orange. The wing is marked with white bars. The female is duller, brownish or olive and dull orange replacing the male's more brilliant colors.

This bird is well distributed in shade trees and along stream borders in the Park. It is particularly partial to the elm tree, when nesting, but may also be found nesting in other kinds of trees. It lives mainly in tree tops and is seldom seen low down in the trees or on the ground.

The song is a loud, rich whistle. A single note, "whewtle" or "whewlee," the first with a fall in pitch, the second with a rise, is often uttered. The longer song consists of these two notes, and some others, repeated and put together in a variety of combinations.

The nest is a deep, pouch-like structure, hung from the low outer branches of an elm or other shade tree. The nest is woven of strings or plant fibers, those stripped from last year's stalks of Joe-Pye weed

being a favorite. It is lined with horsehair. The eggs are marked with fine irregular crisscross lines, that make them appear as though cracked. In July, young Orioles that have tumbled from the nest and are still unable to fly well, may be found. They are quite noisy, and if they escape marauding cats, will be fed by the parents till able to care for themselves.

CEDAR WAXWING. *Bombycilla cedrorum* Vieill.

This bird, a little larger than the English Sparrow, may be easily distinguished from all other summer birds of the Park by the crested head, soft brown, gray and yellowish plumage, the black about its eyes and the yellow band across the end of the tail. The red wax-like tips of the wings are not present in all individuals. Young birds show a whitish mark over the eye, but at first lack the black eye patch, and their breasts are streaked with light brown. The soft smooth plumage of this bird makes it, while not particularly brilliant, one of the most beautiful of American birds.

The Cedar Waxwing is quite common in the Park. It inhabits orchards and shade trees, but is also found to some extent along stream borders, and about the edges of thickets and forests. It lives in the trees and bushes, and is easily observed in wild cherry trees when the cherries are ripe and it is gathering them for itself and its young.

This bird is songless, having usually but a single long whine-like note, rather high-pitched and faint. Mr. Silloway describes another note, a loud screech produced by a wounded bird. I once captured a bird that had broken its wing against a wire, and as I caught it, it gave the same frightened cry.

The nest is built in a bush or tree, rather later than most species, nesting being at its height in August. The young are fed largely on cherries and smaller berries, the parents carrying these to the nest in their throats, and ejecting them one at a time when feeding the young (cf. Herrick, 1905, pp. 86-102).

BRONZED GRACKLE. *Quiscalus quiscula æneus* Ridgw.

The Grackle is a little larger than the Robin. It is entirely black, with rich, metallic reflections of purple, bronze and green. It may be known from other Blackbirds by the larger size and the long tail, in which the middle feathers are longest. This tail, when spread in flight, is shaped like the keel of a boat. The female is a little smaller and duller than the male.

The Grackle is fairly common in and about the Park, nesting in shade trees and orchards and feeding largely in the open meadows or along the shore of the river. It is likely to be in small flocks even when nesting, and several nests are often built in the same tree. It walks rather than hops, as do all the Blackbirds.

The voice of the Grackle is always harsh. The common call is a "chack" similar to that of the Red-wing. In spring the birds utter harsh, raucous notes that evidently serve as a song.

The nest is a large, bulky structure, placed in a tree. Evergreen trees are preferred, particularly planted spruces; but apple trees, maples and various others are used where evergreens are not to be found.

NORTHERN FLICKER. *Colaptes auratus luteus* Bangs

The Flicker is easily distinguished from other birds in many ways. It is larger than the Robin, with a brown back, barred with black and marked with a patch of white above the base of the tail which is conspicuous in flight. There is a red crescent-shaped patch on the back of the neck and a similarly shaped black patch on the front of the breast. The under parts are buff color and spotted with black. As the bird flies past, with the characteristic undulatory flight of a woodpecker, the yellow wing linings flicker, reminding us of its common name.

This bird is common in the Park, mainly in orchards and among shade trees, but also in trees along the stream margins and in the forests, preferring those that are more open. It frequents trunks and limbs of trees, and is found also on the ground, a habit not common with most Woodpeckers. Ants, which it gathers when on the ground, make up a large part of its food.

The notes of this woodpecker are varied. In the spring and early summer it gives a long call, "wick wick wick wick," repeated many times, either all on one pitch, or gradually rising and falling at the beginning and end. A common call is "keeyah," slurring downward; and a third note, produced in the courtship performance in spring is "oo-eka, oo-eka, oo-eka." The bird also drums on dead limbs like other Woodpeckers.

The nest is in a hole in a dead limb or trunk of a tree, or drilled in a telephone pole. Several nests were located in the Park. They may be known by the size of the opening, too large for any other woodpecker, except the Pileated, and too small for that bird.

DOWNY WOODPECKER. *Dryobates pubescens medianus* (Swain.)

This is the smallest of the Woodpeckers. It may be distinguished from the Hairy Woodpecker mainly by size, but also by the black bars on its outer tail feathers. From the Sapsucker it may be told by the continuous white back, and in the male, by the small red spot on the back of the head. The wings are spotted with white, but without the broad white patch of the Sapsucker.

Downy Woodpeckers are common in the Park, frequenting orchards and shade trees, and are also found in trees of the stream border and in the forests. In the latter place they are less common than the Hairy Woodpeckers.

The common call of this Woodpecker is a sharp, high "keep" similar to that of the Hairy Woodpecker, but not so loud. Another call is "he-he-he-he-he" descending in pitch and entirely distinct from the rattle-like call of the Hairy Woodpecker.

The nest is like those of other Woodpeckers but the entrance is smaller in size. The nesting hole with its round opening is exca-

vated in the trunk or limb of a dead tree. Young birds, out of the nest, were observed in the Park.

WARBLING VIREO. *Vireosylva gilva gilva* (Vieill.)

This bird, smaller than the English Sparrow, is plain dull grayish green above, without wing bars, and plain white tinged with yellow beneath. The lack of wing bars distinguishes it from all Vireos but the Red-eye. The greenish top of the head and more yellowish sides separate it from that bird, and also from the Tennessee Warbler.

It is not common in the Park, and it occurs mainly in trees along the stream valleys, or high up in maple and elm shade trees. Only two birds were observed in the Park itself, one on Quaker Run and one in the Tunungwant Valley. Several were noted in the shaded streets of Salamanca and in trees along the river near that city.

The song of the Warbling Vireo identifies it better than the plumage. It is a sweet warble, of usually ten to twenty notes, varying in pitch, but seldom with two notes together on the same pitch. The song is continuous and rapid, all the notes being linked together. Every fourth or fifth note is slightly accented, and the song frequently ends on a high-pitched, accented note. It resembles the Purple Finch song somewhat, but a good ear will easily distinguish it.

The nest is a pocket-shaped structure of bark, hung from a forked limb of a tree. It is quite similar to the nests of other species of vireos, but averages a little shallower.

LEAST FLYCATCHER. *Empidonax minimus* (W. M. & S. F. Baird).

This little bird is considerably smaller than the English Sparrow, and the smallest of the flycatchers of the Park. It is marked much like the Wood Pewee, but is somewhat greener on the back, smaller in size, and with a shorter wing. In distinguishing these two birds in the field the notes are more reliable than the plumage.

The Least Flycatcher is rather rare in the Park. A few were met with south of Salamanca, an occasional individual on Quaker Run and in the Red House Valley, and one bird on Limestone Brook. All were either in apple orchards or in shade trees along the roadside, and this is the favorite habitat of the species.

The song of this bird, if it may properly be considered a song, is very simple, and not musical. It consists of a sound like "chebec, chebec, chebec," repeated over and over, now slowly, now rapidly; sometimes only four or five times, then again for a long time at a stretch, without rest. Since the sound is heard mainly in spring and early summer, it should probably be classed as a song.

The nest is a small cup-shaped structure, resembling those of the warblers, and placed in the fork of a tree, usually ten feet or more from the ground. Unlike those of the warblers, however, its eggs are pure white.

SCREECH OWL. *Otus asio asio* (Linn.)

This Owl is easily distinguished from all others by its small size and its ear tufts. No other small Owl has ear tufts. The color of the plumage is gray or reddish brown, the difference being individual, and not due to age, sex or season.

How common this Owl is in the Park it is difficult to say. Owls are not easily found, and the Screech Owl is more silent in summer than in spring or fall. None was heard, and only one seen,—a young bird that flew into a farmhouse on a tributary of Quaker Run the night of July 11. It was captured and kept until I saw it the next day, and then released.

The call of the Screech Owl is not a screech but a long, wavering cry, slowly grading downward in pitch toward the end. It is most commonly heard at night.

The Screech Owl nests in a hole in a tree, an old Flicker hole in an apple or shade tree being a favorite place. It lives most commonly in orchards or shade trees, but is sometimes found in the forest where it shows a preference for evergreen trees, among the branches of which it hides and sleeps in the daytime.

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus* (Linn.)

Adults of this bird, which is about the size of the Robin, are easily known by the red head, the entire head, neck and throat being bright red. The broad black and white patches of the wings and back are also distinctive. Young birds have these patches also, but no red head. The head is spotted with brown, and the rest of the plumage is more or less brownish, and spotted or barred.

This bird is rare in the Park. One adult was seen along Quaker Run, July 11, and several adults and young were seen in the Tunungwant Valley, July 25 and 27. It prefers orchards, shade trees or open forest, but does not occur in dense forests. It may sometimes be seen on fence posts or telephone poles far from any tree.

The note of this woodpecker is a loud and guttural "ker-ruck," suggesting the rattle of the tree toad. It also produces the drumming noise of other woodpeckers. Unlike other woodpeckers, its flight is not always undulatory.

The nest is a hole in a dead limb or telephone pole, similar to those of other woodpeckers. The presence of young birds observed in the Park indicates that they nest there.

CRESTED FLYCATCHER. *Myiarchus crinitus* (Linn.)

This bird is a little smaller than the Robin. Its throat is gray, and its upper parts olive-brown, shading to a bright reddish brown in the wings and tail, which latter is conspicuous in flight. The breast and under parts are pale yellow, and the wings are marked with white bars and edges to the feathers.

The Crested Flycatcher is decidedly rare in the Park. I met with but two, one on Quaker Run, July 7, and one on Wolf Run, July 18. The bird prefers somewhat open country such as that afforded

by orchards and shade trees or rather open forest, as of chestnut and oak. Both birds which I noted were in the vicinity of orchards.

This species is songless, but at times is quite noisy. A common note is a high-pitched, clear whistle, "wheep," which is often followed by a lower and harsher "raa raa raa." The first note can be imitated, and sometimes in the mating season an imitation will bring the bird.

The nest is placed in a hole in a tree, or similar cavity. These birds sometimes nest in bird boxes and can be encouraged to stay in a locality by the erection of such boxes. The nest is constructed of grasses and roots, often with a piece of cast snake-skin added.

BIRDS ABOUT BUILDINGS

It is an interesting fact that a number of birds that formerly lived and nested under natural conditions, have found in the buildings and other structures of man conditions wholly suitable for their homes. These birds, to a greater or less extent, have changed their manner of nesting and now are found more commonly about houses, barns, sheds, bridges and similar structures than in their former natural habitats.

Very rarely now do the Barn Swallow and Chimney Swift nest in their old natural way in caves or hollow trees. In eastern United States this is also true of the Cliff Swallow, whose other name, Eave Swallow, is here more fitting. In a way, it might be appropriate to create another ecological classification, "Birds of the Air," and include all the Swallows, the Chimney Swift and the Nighthawk. It is only the character of the nesting site that makes them birds of buildings, their food consisting almost entirely of winged insects obtained from the air.

In addition to the species here listed, the Flicker, Nighthawk, Tree Swallow, Robin and Bluebird may also sometimes be classed as birds about buildings.

HOUSE WREN. *Troglodytes aëdon aëdon* Vieill.

This bird is much smaller than the English Sparrow. The upper parts are plain grayish brown, barred on the wings and tail with black. The under parts are grayish white without distinctive markings. While it has no very distinctive marks this bird is easily known from other small brown birds such as the sparrows, by its barred rather than striped plumage, and its sharp, slightly curved bill.

The House Wren is abundant about the farm lands of the Park, being found in old orchards and about buildings, where it keeps up an active search for small caterpillars and other insects that form the bulk of its food, the male singing incessantly.

The song is a succession of short, rapid notes, usually beginning with a few low-pitched ones, then suddenly bursting out in an almost explosive manner, with notes that are higher and louder, then falling again in pitch to its termination. It is sung frequently, all

through the period of nesting and feeding the young, from daylight to dark. Until one comes to appreciate it as does the bird lover, its repetition may seem monotonous.

The Wren places its nest in some crack or crevice of a building, in a hole in an apple tree, or in a bird house especially provided for it. It carries to such a place a mass of sticks and feathers, and here brings up a rather large family of six to eight young. The birds work tirelessly when gathering food for their brood.

This is a bird which can easily be attracted to suitable parts of the Park, about farm buildings and orchards, by the erection of bird houses. Houses with an entrance of one inch diameter will suit the Wren, but will be too small for the English Sparrow. This bird may not be entirely desirable in all cases, for some individuals have a bad habit of destroying the eggs of birds larger than themselves by piercing them with their sharp bills, an act which seems in many cases to be purely malicious.

BARN SWALLOW. *Hirundo erythrogastra* Bodd.

Swallows are easily distinguished from all other birds, save the Chimney Swift, by their long pointed wings and swift flight. Their forked tails, brighter colors and different manner of flight distinguish them from the Swift. The Barn Swallow may be distinguished from its relatives, whether in flight or perching, by the deeply forked tail, the outer feathers being fully an inch longer than those of other Swallows.

This Swallow is common and widely distributed in all open country in the Park, being commoner than any other, unless perhaps the Cliff Swallow, which is a bird more local in distribution but decidedly outnumbering the Barn Swallow in several localities. Barn Swallows may be commonly seen in the Park, flying swiftly about in open country, now high in the air, now darting and skimming low over water or meadows. As a rule they choose a wire for perching, but young birds often perch on the roof of a barn or on the dead branches of a tree top, where they wait for the approach of the parents with food.

The song of the Barn Swallow is a long pleasing twitter, not unmusical, and usually uttered in flight. Its quality best distinguishes it from the twittering of other swallows. The time and pitch are decidedly variable.

The nest of this swallow is placed on a beam or against a rafter, inside a barn loft. It is made of mud and straw and lined with feathers. Young birds may be seen out of the nest in July. The parents continue to feed them for some time after they leave the nest. This evidently is a habit with all swallows, probably because it takes time and practice for the young to become adroit enough on the wing to catch their own food.

CLIFF SWALLOW; EAVE SWALLOW. *Petrochelidon lunifrons lunifrons* (Say)

This bird may be distinguished from the Barn Swallow, the only other with dark blue and chestnut coloration, by the less deeply-

forked tail, the white forehead, which is easily seen when birds are perching, and the salmon-buff patch on the lower back, which is readily discerned in flight. Young birds also have these distinguishing marks, but lack the chestnut-colored throat. When they are perching breast forward the gray throat suggests a Rough-winged Swallow, and the other marks must be carefully looked for.

Like the Barn Swallow, this species is mainly a bird of the air, but is found about barns and perched on wires. It is locally exceedingly common in the Park. Colonies nest in the Red House Valley on lower Quaker Run, and west of Limestone, in the latter place outnumbering the Barn Swallow at least ten to one. I did not observe it near Salamanca.

The twitter of this Swallow is similar to that of the Barn Swallow, but in a peculiar squeaky voice that at once identifies it.

Nests are placed in colonies under the eaves of a building, most often an unpainted barn. In some localities the birds build against the rock faces of cliffs, but no such colony was seen in the Park. The nests are constructed of mud, and are retort-shaped, and lined with grass and feathers. Frequently the parents occupy the nest together, when the heads of both may be observed side by side at the opening. The fledglings often return to the nest after they have left it once, a habit rare among birds.

CHIMNEY SWIFT. *Chaetura pelagica* (Linn.)

This dusky bird could only possibly be confused with the Swallows. From these it is distinguished by the rounded rather than forked tail, the dark under parts, nearly as dark as the back, the habit of never perching, and rarely resting anywhere save inside of a chimney, and the distinctly different flight. What the difference in flight is, is hard to say. It has always seemed to me that it beats its wings alternately, but the swallow both together.

The Chimney Swift is quite common in the Park, flying about here and there in the stream valleys, and frequently dropping into an old open-topped chimney. Often, in the midst of the forested areas far from any buildings, I heard the notes of these birds flying above the tree tops. This led me to think that they may still nest in hollow trees somewhere in the Park area. It might well be, for the bird is quite common, yet the open-topped chimney it prefers is now rather rare.

The notes of this bird are a loud, rapid series of "chips," sounding like "chip chip chipper chipper chipper chipper chip," usually produced when several birds are flying about in company.

The nest placed on the inside of a chimney is bracket-shaped and built of twigs, fastened together and to the chimney wall by the glue-like saliva from the bird's mouth.

ENGLISH SPARROW; HOUSE SPARROW. *Passer domesticus* (Linn.)

This well-known but little-esteemed bird is about six inches in length. The male is marked with a broad stripe of rich chestnut-brown on the sides of the head, and a patch of the same on

the shoulders. The top of the head is gray, the under parts are plain grayish white, the throat and upper breast marked with a broad patch of black. The female is plain dull grayish brown, without chestnut-brown marks or black breast mark.

The English Sparrow, introduced into America in 1850, and especially common everywhere about cities, is abundant in many places in the Park, staying about farm buildings. It is not found far away from buildings, however.

It has no song, but utters a large number of loud, rather harsh, chattering noises, and flocks of the birds keep up an incessant clatter.

The nest is a mass of grasses or twigs, lined with feathers. It is placed in any crack or crevice of a building, occasionally in a hole in a tree, and sometimes on top of a horizontal limb, in which case the nest is arched over with the entrance in one side.

PHŒBE. *Sayornis phæbe* (Lath.)

The Phœbe is a little larger than the English Sparrow and plain grayish brown on the upper parts, darker on the head, and grayish white beneath. There are two faint, light wing bars. While the bird has no very distinctive marks or colors, the flycatcher shape, with rather large head, and the habit of sitting still on a perch,—flirting the tail at intervals,—will distinguish it from all except Flycatchers; while the size well separates it from the larger King-bird and Crested Flycatcher, and the smaller Wood Pewee and Least Flycatcher.

The Phœbe is a common bird in the Park, being found mainly near buildings or bridges, in open country. It frequents orchards and shade trees, and likes the vicinity of water where small flying insects abound. Sometimes it is seen near rocks that afford it nesting sites. Several pairs were nesting and feeding young at Quaker Bridge, and it was noted in all the valleys near farm buildings, but did not seem to be common about Limestone.

This bird, though a flycatcher, may be said to have a song. It is a simple one, consisting of the syllables "Phebe—peeree—phebe—peeree" repeated at intervals, the "phebe" with the second note lower in pitch than the first, while the "peeree" has the second note higher and somewhat burred in quality. At times this song is sung in flight, when the bird prefaces it with a loud, rapid "pit pit pit pit" as it launches into the air.

The nest is built on a beam or rafter of a building, or underneath a bridge, or sometimes on a shelf against the face of a rock. It is made of mud, lined with hair, and covered with moss on the outside. The five or six eggs are pure white. A rock nest of this bird was discovered along the track of the Pennsylvania Railroad below Wolf Run.

STARLING. *Sturnus vulgaris* Linn.

This bird is a little smaller than the Robin. Adults are iridescent black in color, the feathers tipped with buff in fresh fall plumage.

which gives the bird a speckled appearance in fall and winter. The tips wear off, until the bird is nearly solid black by spring and summer. The bill in summer is bright yellow. Young birds in first plumage are plain grayish brown. This bird may be distinguished from the blackbirds by the long, pointed yellow bill, short tail and more pointed wings. In fall and winter when the bill is black the speckled plumage will identify it.

The Starling is not at this writing a common bird in the Park. It was introduced from Europe in the vicinity of New York City, and from that point is spreading about the country, but is evidently not yet numerous in the western part of New York State. I noted a single flock of these birds numbering eighteen in a field near Limestone. It is probable that they will increase steadily in numbers, and their presence may constitute a serious problem. They inhabit orchards, shade trees and the vicinity of buildings and open fields, but will probably never spread to the dense forests of the Park.

They have a variety of calls and whistles. One performance is a rather squeaky "Phree phree phree," not particularly loud. Another is a loud, clear, whistled "whee-ew," slurred downward. Still another is "hoo wheet," a loud whistle resembling the call of the Bob-white, but higher in pitch, and delivered more rapidly. In addition to these, Starlings seem to have learned, since coming to America, to imitate calls of many American birds, the Wood Pewee and the Cowbird being favorites.

The Starling nests in holes in trees, bird boxes, or crevices about buildings. It will occupy old woodpeckers' holes or natural cavities in trees, showing a great liking for those in old apple orchards. These habits have caused it to displace, to some extent at least, the Bluebird and the Flicker. This is one of the reasons why this alien bird is undesirable. The nest is built of grasses, and several pale blue eggs are laid. Nesting begins in April and flocks of young birds may be seen out of the nest in late May.

BIRDS OF THE OPEN FIELDS

Open meadows and grasslands (plate 25 and figure 75) occur in the Allegany State Park, mainly in the valleys along streams (map 4). Probably no grass areas were naturally in that condition formerly, but they have been cleared of their original forest long ago. They occur to some extent on the hillsides, but since the soil there is poorer and more difficult to cultivate, such areas are smaller in extent, and often are left to revert slowly to original forest growth (figure 76).

The meadows are nearly all under cultivation; either hay or oats, corn, buckwheat and other grains and vegetables being raised. Cultivation seems to have increased rather than decreased bird life, and it is noticeable that there are more of the true meadow birds in cultivated hay fields than in wild ones.

In cultivated hay fields, the nesting ground of most of the true meadow birds, the principal species of plants are timothy (*Phleum pratense*), red top (*Agrostis alba*), tall fescue grass (*Festuca elatior*), meadow grass, (*Poa pratensis*), and pink clover (*Trifolium pratense*). Under wild or partially cultivated conditions, many species of weeds and other grasses occur. The commonest of these, in order of abundance are white weed (*Chrysanthemum Leucanthemum*), milkweed (*Asclepias syriaca*), black-eyed susan (*Rudbeckia hirta*), daisy fleabane (*Erigeron ramosus*), St. John's-wort (*Hypericum perforatum*), early goldenrod (*Solidago juncea*), buttercup (*Ranunculus acris*), velvet grass (*Holcus lanatus*), mallow (*Malva moschata*), self-heal (*Prunella vulgaris*), goldenrods (*Solidago patula*, *S. lanceolata* and *S. rugosa*), Canada thistle (*Carduus arvensis*), evening primrose (*Oenothera biennis*), clovers (*Trifolium repens* and *T. hybridum*), orange hawkweed (*Hieracium aurantiacum*), and quack grass (*Agropyron repens*).

The drier hillsides that are clothed with grasses show other species, poverty grass (*Aristida dichotoma*) and wild oat grass (*Danthonia spicata*) being the common grasses, and such weeds as cinquefoil (*Potentilla canadensis*) and hop clover (*Trifolium procumbens*) becoming common. Such areas have little bird life, only the Vesper Sparrow among the meadow birds occurring in them commonly. Probably the Prairie Horned Lark prefers such areas, but it is decidedly rare in the Park. Where rock outcrops occur on such open hillsides the Nighthawks will probably be found nesting.

In addition to the birds listed below, the following species will sometimes be found either feeding or nesting in open meadows and fields: Spotted Sandpiper, Killdeer, Mourning Dove, Sparrow Hawk, Crow, Red-winged Blackbird, Grackle, Starling, all the swallows, Robin and Bluebird.

VESPER SPARROW. *Poœcetes gramineus gramineus* (Gmel.)

The Vesper Sparrow is of about the same size as the English Sparrow. It is best distinguished in flight by the white outer tail feathers. When perching, the stripes on the throat and breast, the bay-colored patch on the shoulders, and the wing bars help to distinguish it.

The Vesper Sparrow lives in the open meadows and grain fields. It is quite common in all such places in the Park area. More than most of the meadow birds, it extends its range up to the grassy hillsides that have been cleared of their original forest for pasture land. It is less common here, however, than in the broad, flat meadowlands of the valleys.

The bird feeds on the ground and walks rather rapidly. It may often be seen in the middle of a road. It commonly perches on trees, posts and wires, and usually chooses such places to sing.

Its call notes are not markedly different from those of other sparrows. Its song is sweet and clear, and a little like the Song Sparrow's in form. Many beginners overlook this bird simply be-



Fig. 75. Meadow of timothy and other grasses. Haunt of Meadowlark, Bobolink, and Savannah and Vesper Sparrows.



Fig. 76. An old field reverting to forest. Showing succession from environment of Meadowlark and Vesper Sparrow to that of such forest margin and thicket species as Field Sparrow, Indigo-bird and Chewink.



Fig. 77. Upland Thicket. Home of the Field Sparrow, Indigo-bird, Towhee, Brown Thrasher and Chestnut-sided Warbler.



Fig. 78. Thicket encroaching on grassland of a hillside near Quaker Run, where one may find the Towhee, Field Sparrow, Indigo-bird and Brown Thrasher.

cause they mistake its singing for that of a Song Sparrow. The Vesper Sparrow begins with two or three pairs of long, sweet notes, each pair higher in pitch than the last, then terminates the song with a series of quick notes and trills that usually descend in pitch. While one can make no fixed rule as to how a Song Sparrow will begin its song, it is practically never with two pairs of long notes. The introductory notes, whether two, three or more, are short and quick, with pauses between them. Once this difference is learned it will always serve to separate the songs of these two birds in the field.

The nest of the Vesper Sparrow is placed on the ground in grassy places. No nests were found in the Park, but several young out of the nest were seen.

SAVANNAH SPARROW. *Passerculus sandwichensis savanna* (Wils.)

The Savannah Sparrow is a little smaller than the English Sparrow. It may be known by a narrow light line through the center of the crown, and over each eye a broader one, which is bright yellow in front of the eye. The breast is streaked and a few birds show a dark spot in its center like that of the Song Sparrow. Male and female are alike, and the young are marked in the same way.

This little bird is common in the meadows of the Park. It lives in the tall grass, and rarely perches higher than the top of a fence post or, more frequently, a tall weed.

It delivers its song from such perches. The song is weak and insect-like in quality, a fact which will distinguish it from all sparrows save the Grasshopper Sparrow. While there is some variation, the syllables "zip, zip, zip zee-e-e zee-e-e" will fit the majority of songs. The two "zees" are on different pitches, but which one is higher is a matter of individual variation. The Grasshopper Sparrow, which is a much rarer bird than this one in the Park, usually sings but a single "zip" and one long "zee-e-e-e." Its voice is less musical and even more insect-like than that of the Savannah Sparrow.

The Savannah Sparrow's nest is placed on the ground amid the grasses of a field, and is difficult to find, unless by accident, when one almost steps on it. In such cases the sitting bird slips out from under one's feet, and runs off through the grass with motions more like a mouse than a bird.

MEADOWLARK. *Sturnella magna magna* (Linn.)

The Meadowlark is about the length of the Robin, with a rather short tail. Its upper parts are brown, striped with black and light buff. The outer tail feathers are marked broadly with white patches which are conspicuous in flight. The throat and breast are yellow and crossed by a broad V-shaped black mark.

The Meadowlark is abundant in all meadow areas of the Park and may be easily seen and heard. It is a bird of the ground largely, walking and threading its way through the grass, and gathering most of its food there. It may be commonly seen feeding

in newly-mown hay fields. It often perches on posts, poles, fence rails or tops of trees, usually in a conspicuous place. It sings from such vantage points, and also from the ground or in flight.

The call notes of the Meadowlark comprise a long harsh chatter, a single short but similar note, and a single longer note that is slurred downward with a harsh, somewhat nasal quality. The song is a loud, clear whistle, consisting of from two to six notes, most commonly four or five. In the majority of songs, two or more notes are slurred together, most of these slurs being downward in pitch. While the song is comparatively simple, it is subject to great variation. Anyone who attempts to fit the words "spring o' the year" to every Meadowlark song he hears will quickly note this. To some songs the words fit nicely; to many others they do not fit at all. This variation is indulged in by each individual bird, the bird singing one song for a time, then changing to something different.

The nest of the Meadowlark is placed on the ground, and well hidden in the tall grass. It is frequently arched over the top and usually contains five or six eggs or young.

COWBIRD. *Molothrus ater ater* (Bodd.)

This bird is a little larger than the English Sparrow. The entire body of the male is glossy black, while the head is dark grayish brown. The female is plain grayish brown all over, slightly glossy above, and somewhat lighter beneath. Young birds are colored like the female, but the breast is lighter and somewhat spotted with darker brown.

The Cowbird is common in the Park and found in all the open country. It lives chiefly in the open meadows, feeding on the ground. It may also be seen among shade trees or in orchards, and about the edges of thickets, but does not occur in the dense forests. In late summer it is most frequently seen in flocks, feeding on the ground in pastures, often among cattle, deriving its name from this habit.

The voice of the Cowbird is harsh or squeaky, but entirely unmusical. A note heard mainly in spring probably serves as a song. It varies somewhat, but a common form may be written, "wee-cheea," the second note slurred downward and delivered in an explosive manner that suggests a sneeze.

The habits of the Cowbird in the nesting season are well known. It is a parasite, building no nest, but depositing its eggs in the nests of other birds, preferably smaller species than itself. On August 2 near the mouth of Wolf Run I found a young Cowbird that was being fed by a Canada Warbler.

BOBOLINK. *Dolichonyx oryzivorus* (Linn.)

This bird is a little larger than the English Sparrow. The male is black, marked with patches of white on the wings and lower back, and a patch of yellowish buff on the back of the neck. The female is plain brown, with darker stripes. All birds, including young, assume a striped plumage in late summer, when the breast is distinctly yellowish.

The Bobolink belongs to the open meadows where it occurs rather locally in the Park. I found it in fields near the lower end of Quaker Run, west of Limestone, and along the river a few miles west of Salamanca, but it is by no means as common or widely distributed as the Meadowlark or the Vesper and Savannah Sparrows. These birds live in the tall grass, or perch on fence posts, wires or trees.

The male sings either from a perch or in flight. The song is a beautiful one, long, loud and greatly varied. The notes are short and quick, with hardly ever two together on the same pitch. The song begins with notes that are low in pitch and somewhat slow, and becomes higher and faster as it proceeds. Certain groups of three or four notes are often repeated once or twice. There are no pauses, the bird not once stopping for breath as other flight singers are likely to do. To me there are no parts of the song that sound like "bobolink" or even "spink spank spink." The flight song is as a rule longer than that sung from a perch.

The nest is well hidden in the tall grass, and since the sitting bird has a habit of running some distance through the grass before flying, when one approaches, it is difficult to find.

NIGHTHAWK. *Chordeiles virginianus virginianus* (Gmel.)

This bird is about the length of the Robin, but when flying seems much larger because of the long, pointed wings. It may be best identified by the conspicuous white spot in each wing, and the peculiar swift, swooping flight. The plumage is mainly gray, and the male is marked by a white throat, and white marks in the tail.

This species is fairly common in the Park and still commoner in Salamanca. It may be seen toward evening, flying about in the open in search of insects. In the middle of the day it is seldom seen unless one finds it by accident, on a rock or bit of stony ground in an open field.

The Nighthawk has a single loud note, "peent," which identifies it easily, once it is known. In early summer it often swoops downward through the air, producing a loud booming or roaring noise with the wings.

It constructs no nest, but lays its two mottled eggs on a bare rock or on bare stony ground of an open hillside or ridge. In cities it finds favorable nesting sites on the flat, pebbled roofs of tall buildings. This habit is probably the cause of its greater abundance in Salamanca than in the Park itself.

MARSH HAWK. *Circus hudsonius* (Linn.)

The Marsh Hawk may be easily distinguished from all other Hawks by the white patch on the lower back, which is present in all plumages. Males are a beautiful light gray above, and white below. Females and young are brown above and streaked heavily with brown beneath. The narrow wings, long tail and peculiar flight will separate this Hawk from other large Hawks, almost as readily as the white of its lower back.

Marsh hawks are not common in the Park, and occur only in open country, flying over meadows and marshes. A single bird was seen in the Tunungwant Valley on July 23 and again on July 27. Two birds were seen together along lower Quaker Run on August 5. All birds seen were in the female or juvenile plumage.

The notes of the Marsh Hawk are a loud scream, used chiefly in the mating season when the male birds indulge in a curious undulating courtship flight, and a loud "eh eh eh eh eh" given when the nest is threatened.

The nest is placed on the ground in the tall grass of a meadow, or sometimes in a marsh. Whether the bird nests in the Park or not is a question that would be more easily settled in early summer. There are in fact a number of areas such as it would ordinarily choose for nesting sites. Females and young birds wander considerable distances in late summer, hence their presence in a locality is no certain indication of their nesting there.

PRAIRIE HORNED LARK. *Otocoris alpestris praticola* Hensh.

This bird is slightly larger than the English Sparrow. Its back is light brown, faintly streaked with blackish. There are black markings about the eyes and on the cheeks, and a white line over the eye. The throat is white or slightly yellow, and the under parts white with light brown sides. There is a black patch on the breast. The tail is black except the two middle feathers which are brown. The outer feathers are edged with white. On either side of the head are tufts of elongated feathers or "horns" which the bird can raise at will.

The Horned Lark is rare in the Park. It probably occurs mainly in open grass areas on hillsides. The only individual seen, however, was in the middle of a dusty road just west of Limestone on July 25. A high grass hill stands near this point, where the bird may have lived and bred, but my search on this hill for others of this species was unsuccessful.

The song of this bird is sung occasionally from a perch, but most frequently on the wing. It is a weak, high-pitched twitter, not especially musical. A high-pitched call note is characteristic and when once learned, easily identifies the bird. Except in the nesting season the bird is likely to be seen in flocks.

The nest is placed on the ground in a grassy field, and is often in a hollow so that its rim is level with the ground.

GRASSHOPPER SPARROW. *Ammodramus savaunarium australis* Mayn.

The Grasshopper Sparrow is smaller than the English Sparrow. It may be distinguished from the Vesper and Savannah Sparrows by the lack of spots or stripes on the breast, and from other plain-breasted Sparrows by the buff color of throat and head and yellow mark in the bend of the wing.

This bird is rare in the Park, occurring in open grass meadows. I have met with it in but three places within the Park area: south



Drawn by Edmund J. Sawyer

PLATE 26. BIRDS OF THE UPLAND THICKETS AND WOODS MARGIN

- | | |
|---|---|
| 1, Brown Thrasher. | 6, Field Sparrow. |
| 2, 3, Indigo Bunting (male and female). | 7, 8, Mourning Warbler (male and female). |
| 4, 5, Towhee (male and female). | 9, Chestnut-sided Warbler. |

of Salamanca, July 14; west of Limestone, July 23; and in the Cold Spring Valley, July 20. Only one bird was seen in each place. Outside the Park area I found two birds west of Salamanca along the river on July 3.

The song should be carefully distinguished from that of the Savannah Sparrow which it resembles. It sounds like "zip ze-ee-ee-ee" differing from the Savannah by the single "zip" and single long "zee." The song is not so loud but more grasshopper-like than the Savannah Sparrow's.

The nest of this bird is well hidden in the grass of a meadow. It is made of grasses and usually arched over the top.

BIRDS OF THE UPLAND THICKETS

Many birds live mainly in and about low bushes, particularly those that are thick and thorny (plate 26). Such birds are not likely to be found in the forest or among tall trees, nor do they favor open meadows. Almost all small birds are inhabitants of bushes to some extent, as these bushes are a protection from Hawks and other natural enemies.

In the Allegany Park, thicket areas are common and of several sorts. Areas of natural forest land that have been recently cut form thickets of young sprouts that are either oak and chestnut or maple and beech in type (figure 77). In other places, hillsides formerly cleared and either cultivated or used for pasture, were later abandoned (figure 78), and these areas have a thicket growth mainly of seedling trees rather than sprouts. Particularly where there have been pastures, other species than the forest trees have come in, such as the thorns (*Crataegus Crus-galli* and *C. coccinea*), apple (*Pyrus Malus*), choke cherry (*Prunus virginiana*), and silky dogwood (*Cornus Amomum*). There seems to be a greater abundance of hornbeam (*Carpinus caroliniana*) in seedling thickets, but except for this the tree species are about the same as in the two forest types. There seems to be no great difference in the bird life of the different sorts of thicket.

Along the stream border are areas that also might be classed as thicket, but with different species of both birds and plants. I have considered this type under the heading: "Birds of the Stream Thickets."

As thickets grow up to forest, an ecological succession of animals as well as plants results, the thicket birds disappearing and the forest species taking their place. One may find woodland areas of different ages in the Park that illustrate this. The final change seems to take place when the cover is ten to fifteen feet high, but owing to the denser growth, this occurs sooner in the maple and beech than in the oak and chestnut type. In the same manner, where grasslands slowly grow up to thickets, a succession takes place from birds of the open fields to birds of the dense thickets.

In addition to the species listed here as occurring in thickets the following, listed under other habitats, are often found there:

Mourning Dove, both Cuckoos, Goldfinch, Song Sparrow, Rose-breasted Grosbeak, Cedar Waxwing, Maryland Yellow-throat, Canada Warbler, Catbird and Veery.

INDIGO BUNTING; INDIGO-BIRD. *Passerina cyanea* (Linn.)

This little bird is smaller than the English Sparrow. Its entire body is brilliant blue, darker on the head. The wing and tail feathers have blackish or dusky edgings. The female is plain grayish brown, not striped beneath, with a faint bluish tinge to the wings not easily detected in the field. She is liable to be mistaken for a sparrow unless in the company of her mate.

The Indigo Bunting is one of the commonest birds in the Park. In fact it is more abundant in this region than in any other with which I am acquainted. I consider it second only to the Song Sparrow in numbers here. It is an inhabitant of thickets mainly, but is also found along the stream border among low bushes, its distribution and associations being quite similar to those of the Towhee.

The song of this bird is loud, high-pitched and not particularly musical in quality. It is quite variable in form, but usually decidedly rhythmic, the notes being grouped in ones, twos and threes, each group occupying the same amount of time. The pitch moves up and down irregularly, but all the notes of one group are pitched alike.

The nest of this bird is in a thick bush or tangle of vines, usually not more than three feet from the ground. The eggs are white or faintly tinged with blue.

TOWHEE; CHEWINK. *Pipilo erythrophthalmus erythrophthalmus* (Linn.)

This bird is nearly as long as the Robin, with a rather long tail and short wings. The male is mainly black above, with white marks in wing and tail, black breast, white under parts, and sides broadly brownish red. The female is a soft brown where the male is black, but otherwise similar, while young birds are striped in dull brown.

The Towhee is quite common in the Park, and found mainly in thickets that are either second growth where forests were cut over, or old pasture lands overgrown with bushes and young trees. It prefers thickets on the drier hillsides as a rule, but is sometimes found in valleys along streams. It is a bird of the ground and low bushes, getting much of its food by scratching among leaves and débris.

The call of this bird, "chewink," is a clear note with an upward slur, from which it derives its names. "Chewink" sounds to me more like the call than "towhee." The song consists most often of two notes, followed by a trill. Most commonly the first note is highest, the second lowest and the third medium in pitch, but the first notes are sometimes reversed. The words "drink your tea" have been put to it, and while this is a better fit than

most English words put to bird song, "tink you terererere" would be better. Songs with but one low note followed by a trill, "ting tr r r r," are common; and other variations, sometimes rather puzzling, are to be heard.

The nest is placed on the ground under bushes or a few feet up in a thick bush. A nest found July 6 on Quaker Run, was in a silky dogwood, and another with four eggs, found July 13 near Red House Creek, was also in a bush. It may be that in this region nests are commonly placed in bushes, but in most localities ground nests are more common.

FIELD SPARROW. *Spizella pusilla pusilla* (Wils.)

The Field Sparrow is smaller than the English Sparrow. It may be known by the unstriped, grayish white breast, pale reddish brown upper parts with the head no redder than the back, and by its pinkish bill and feet. Young birds are striped on the breast.

The Field Sparrow is one of the common thicket birds of the Park, being found in young second growth where forests have been recently cut, or in thickets that have sprung up on old pasture hillsides. It is entirely characteristic of such places and not likely to be found elsewhere.

The song of this bird is one of the sweetest and purest in quality, though simple in form. It consists of short, quick whistles that grow rapidly faster, finally ending in a trill. Changes in the pitch are usually gradual, the song slowly grading up or down to its termination. The introductory notes are often slurred, more commonly downward, but frequently upward.

The nest is placed in a thick bush two to four feet from the ground. Rarely it is on the ground itself, but when this is the case, under a bush. It is much like the Chipping Sparrow's nest, lined with hair or sometimes grasses, but instead of blue, the eggs are white and spotted with reddish brown.

CHESTNUT-SIDED WARBLER. *Dendroica pensylvanica* (Linn.)

The Chestnut-sided Warbler, smaller than the English Sparrow, is beautifully and strikingly marked. The top of the head is bright yellow, and the remainder of the upper parts olive-brown, striped with black, with broad yellowish white bars in the wings and white patches on the outer tail feathers. The under parts are white, the conspicuous white cheek patch marked off by black lines and each side marked with a stripe of brightest chestnut. The male and female are similar but the male much more distinctly marked.

This little bird is quite common in thickets in the Park. Wherever original forest has been cut over and has grown up to sprouts or seedlings five to ten feet in height, this warbler is common. It is also found in the more open oak and chestnut forests, where there is an undergrowth of such shrubs as azalea, blueberry, silky dogwood or New Jersey tea. It is entirely absent in the more dense maple and beech woods.

The song of this warbler is loud and clear, of fair musical qual-

ity, and when sung in its most typical form thoroughly distinctive. It consists of six to ten notes, with the next to the last note highest in pitch, longest in time, and loudest in accent. The last note is dropped suddenly in pitch and not accented. It may be written "cherwee cherwee cherwee cherwee cherweechee." Other variations of the song are less commonly heard, less definite in form, and consequently less easily recognized.

The nest of this bird is placed in a low bush such as blueberry, azalea or *Ceanothus*, very near the ground. It is the usual warbler nest, a cup-shaped structure of bark, fibres, leaves and grasses.

BROWN THRASHER. *Toxostoma rufum* (Linn.)

The Brown Thrasher, erroneously called also Brown Thrush, is a little longer than the Robin. It is a long-tailed but rather short-winged bird, with a long, sharp, somewhat curved bill. The upper parts are bright reddish brown, with two white bars on the wing. The under parts are white, streaked on the breast and sides, but not the throat, with brown. While colored like a thrush this bird is distinctly different in shape, as well as in habits and song.

This bird is fairly common in the Park, living in thickets of low dense briery bushes. It is easily found in early summer when it is singing at the best, but the song ceases earlier than most species, after which the bird is seldom seen. It does not often go far above the ground, but when singing chooses as high a perch as there is in its vicinity.

The song is loud, clear, long-continued and greatly varied. It consists of short, quick phrases, each repeated rapidly two or three times, then a short pause before the next phrase is taken up. The time is now accelerated, now retarded: the pitch may vary as much as two octaves from highest to lowest notes, and even the quality changes, most of the notes being musical, but occasional harsh or squeaky sounds are uttered. The bird is a master musician when he chooses to be, but has nothing like the quiet song so greatly loved and admired in the thrushes.

The nest is placed in a low, thick bush or on the ground under such a bush. It is seldom more than three feet from the ground, and is built of sticks and twigs and lined with roots. The eggs are thickly spotted with fine brown spots on a bluish ground.

MOURNING WARBLER. *Oporornis philadelphia* (Wils.)

This beautiful little bird is plain olive-green above. The throat and upper breast are gray, shading in the male to black across the center of the breast. The lower breast and under parts are bright yellow, the line between black and yellow being abrupt and distinct. The female may be known by her gray throat, without black.

This warbler is well distributed in various parts of the Park, but not particularly common anywhere. I found it most frequently in open spots on the border of forests of both maple-beech and oak-chestnut types, where there were dense thickets of raspberry and blackberry bushes. It is evidently an inhabitant of thickets rather than of true forests.

This is a bird I was not well acquainted with before my experience in the Park, and I am not sure the description of the few songs I heard will be typical for the species as a whole. The voice is loud and clear, like that of the Yellow-throat, but the form of the song is quite different. I wrote it "tolee tolee tolee tootletoo" the first part of three or four pairs of notes, higher in pitch, and the last a three-note phrase, and lower. One bird that I heard appended a five-note phrase, "tootletooleeloo," to its song.

The nest of this bird is placed on the ground. Young, out of the nest, were found several times about Quaker Run in July.

YELLOW-BREASTED CHAT. *Icteria virens virens* (Linn.)

The Chat, although classed as a warbler, unlike all the others of that family, is larger than the English Sparrow. Its upper parts are plain olive, the throat and breast rich yellow, sometimes almost orange, and under parts white. A white line over the eye is the only specially distinguishing mark. The bill is rather shorter and heavier than those of other warblers.

The Chat is a rare bird in this region and I have not actually found it within the Park area. A single bird, in song, was observed in a thicket along the road below Salamanca, not far from the mouth of Red House Creek. An empty nest in a bush that looked like that of a Chat was also found, but there was no way to prove its ownership.

To the field student there is nothing about the Chat, unless perhaps its olive and yellow coloring, that suggests a warbler. Its habits and song are totally different from those of the rest of the family. It is a shy and secretive bird, keeping back in the dense thickets, and making no outcry, even when nest and young are threatened.

Were it not for the song this bird would be very difficult to locate. It is a most peculiar one, made up of various odd phrases sung at intervals, with long pauses between them. The phrases are sometimes whistles, sometimes clucking noises, or again squeaky or harsh and rasping. They may be single abrupt notes or a long series of notes. One common phrase comprises a series of low whistles, on the same pitch or running down toward the end, and becoming slower and slower in a perfect *ritardando*. A representation of the song as commonly heard might be as follows: "Whew — kak-kak-kak — whee — kekekekekek — — — hoo hoo hoo hoo hoo — — hoo — — — hoo — — — — hoo," etc.

The nest is well hidden in a thick bush or tangle of vines, and is seldom more than three feet above the ground. The sitting bird slips quietly away when approached, and keeps adroitly out of sight while the intruder is near.

CARDINAL. *Cardinalis cardinalis cardinalis* (Linn.)

Nearly as long as the Robin, with longer tail, the brilliant red body, wings and tail, crested head and black face of this bird make it unmistakable. Yet many an amateur sees a Tanager and calls

it a Cardinal. The female is mainly gray, with tinges of red on crest and wings.

It is a curious fact that rarities among bright colored birds are likely to be found frequently by amateurs far out of their range, whereas duller colored birds, extremely common in their vicinity, remain unknown. The Cardinal is rare in the Park, whereas the other red bird, the Scarlet Tanager, is decidedly common. The finding of this southern bird along a roadside where I had just been listening to Hermit Thrushes and Juncos, was a decided surprise to me. A pair of birds was found on July 23 along the road up Limestone Brook, some four miles west of Limestone, and the male again July 26. I am informed by Mr. T. L. Bourne of Hamburg that this species occurs regularly but rarely in Western New York, and seems to be increasing. It is mainly an inhabitant of thickets and low bushes.

The song of the Cardinal is a series of clear, loudly reiterated whistles, sometimes slurred up the scale, sometimes down. The song often grows louder toward the end. It is exceedingly variable: the bird found in the Park was singing no less than six variations. The four commonest of these songs I wrote as follows: 1. "Twit twit cheeah twit twit twit twit." 2. "Tooweeet tooweeet tootootoo-tootootootoo." 3. "Tooleet tooleet toolit toolit toolit toolit toolit." 4. "Teo teo teo teo teo teo teo teo teo."

The nest is placed in a low, thick bush, usually not far from the ground. The eggs are finely speckled with brown.

BIRDS OF THE FOREST

Forests cover the larger part of the Allegany Park. A characteristic view of these is shown in figure 79. To most visitors these forests will be of greater interest than the other areas. The birds that occur in forests are less well known than those of orchards and fields, yet they are often equally common.

Two distinct forest types occur in the Park, the oak and chestnut forest, and the maple and beech forest (figure 80). The occurrence of either type seems to depend more upon soil and exposure than upon altitude or climatic differences. Oak and chestnut forest covers the smaller area of the two and occurs more commonly on the west side of the Park near the river, on gentle south and west slopes, or broad, flat ridge tops. The maple and beech forest covers the larger area, being the only type found about the heads of streams. It occurs on steep or gentle slopes of north or south exposure or along the tops of ridges, seeming to follow no fixed rule except near the river where it prefers the north and east slopes, leaving the south and west areas to oak and chestnut. While many birds occur only in the maple-beech forest, there seem to be no birds that are characteristic of oak and chestnut alone, although there are many plants that are strictly so.

We may further divide the birds of the forest roughly into those that inhabit the forest floor, those that inhabit the undergrowth,



Drawn by Edmund J. Sawyer

PLATE 27. BIRDS OF THE FOREST FLOOR AND UNDERGROWTH

- | | |
|--------------------------------|-----------------------------------|
| 1, Hermit Thrush. | 7, 8, Black-throated Blue Warbler |
| 2, 3, Hooded Warbler | (male and female). |
| (male and female). | 9, Winter Wren. |
| 4, 5, Junco (male and female). | 10, Oven-bird. |
| 6, Chickadee. | 11, Wood Thrush. |

those that live on the tree trunks and among the larger limbs, and those that live in the tree-tops. No hard and fast rule may be made for any species, however, for those birds feeding and nesting mainly on the ground are often in the undergrowth or even the tree-tops, while those of the tree-tops may descend to the undergrowth or the ground frequently. (See plate 27).

In the forests of the Park are to be found some of the most interesting, most beautiful and most musical of our birds. Such species as the Ruffed Grouse, the Woodcock, and the great Pileated Woodpecker are of interest to everyone. Among the strikingly beautiful birds not only is the brilliant Scarlet Tanager of common occurrence, but also such little woodland gems as the Black-throated Blue, Black-throated Green, Magnolia and Blackburnian Warblers are to be met with almost daily.

The Tanager, various warblers, and the persistent Red-eyed Vireo, whose song is the commonest bird note of the forest, are not remarkable singers. But the soft sweet notes of the Blue-headed Vireo, and the tinkling trills of the Winter Wren will long be remembered by the lover of bird music. Few areas can boast of the songs of four thrushes, the best of all American songsters; yet in the forests of the Park are three, while the Veery along the stream border near the edge of the forest, makes the fourth. The occasional Olive-backed Thrush is well worth listening to, although its music is least enchanting of the four. In special localities Wood Thrushes, with their wonderful flute notes, answer each other through the forests. Most abundant and perhaps best of all are the Hermit Thrushes, whose notes, as clear and sweet as the tones of a bell, are frequent sounds in the depths of the forest, especially in the morning and evening. He who wisely chooses early summer to visit the Park can hardly fail to hear this bird at its best.

Birds of the Forest Floor. The forest floor in the Allegany Park is not only all that might be desired from the forester's standpoint, with a deep, moist humus that results in wonderful reproduction of the trees, but to the lover of nature it is of great beauty and interest also (plate 27 and figure 81). Here are many picturesque, moss-covered logs, beautiful beds of ferns, and tangled masses of trailing vines and woodland plants with leaves of many shapes and shades of green (figure 82). The lover of wild flowers, if he knows the meaning of these many summer leaves, will long to see the plants in full bloom in May and June. In July only the *Dalibarda*, whose white flowers suggest the spring freshness of an *Anemone*, blooms to give a hint of what must have been there a month or two before.

The plants of the forest floor differ somewhat in the two types of forest, some species being found in both types while others are confined to only one. Owing to the fact that in some species the entire plant dies down before midsummer, and in others the lack of flowers at that season makes identification uncertain, it is probable that many species are omitted from the following list.

The plants found in both types of forest, in order of abundance

are wintergreen (*Gaultheria procumbens*), partridge berry (*Mitchella repens*), hay-scented fern (*Dicksonia punctilobula*), lady fern (*Asplenium Filix-femina*), white clintonia (*Clintonia umbellulata*), dalibarda (*Dalibarda repens*), crested shield fern (*Aspidium cristatum*), wild lily of the valley (*Maianthemum canadense*), jack-in-the-pulpit (*Arisaema triphyllum*), christmas fern (*Aspidium acrostichoides*), blue-stemmed goldenrod (*Solidago caesia*), round-leaved yellow violet (*Viola rotundifolia*), trillium — three species of which, the red (*Trillium erectum*), white (*T. grandiflorum*), and painted (*T. undulatum*), are reported blooming in spring but are not easily distinguished in summer by the leaves, — mandrake (*Podophyllum peltatum*), downy yellow violet (*Viola pubescens*), maidenhair fern (*Adiantum pedatum*), club mosses (*Lycopodium complanatum*, *L. obscurum*, *L. clavatum* and *L. lucidulum*), polypody (*Polypodium vulgare*), evergreen wood fern (*Aspidium marginale*), white wood aster (*Aster divaricatus*), rattlesnake fern (*Botrychium virginianum*), star flower (*Trientalis americana*), indian cucumber-root (*Medeola virginiana*), bellwort (*Uvularia perfoliata*), false solomon's seal (*Smilacina racemosa*), wild ginger (*Asarum canadense*) and indian pipe (*Monotropa uniflora*).

Plants occurring only in maple and beech forest are the barren strawberry (*Waldsteinia fragarioides*), goldthread (*Coptis trifolia*), Canada violet (*Viola canadensis*), wood sorrel (*Oxalis acetosella*), wood reed (*Cinna arundinacea*), mountain aster (*Aster acuminatus*), long beech fern (*Phegopteris polypodioides*), silvery spleenwort (*Asplenium acrostichoides*) and showy orchis (*Orchis spectabilis*).

Plants occurring only in chestnut and oak forest seem more numerous. These are brake (*Pteris aquilina*), oat grass (*Danthonia spicata*), dogbane (*Apocynum androsaemifolium*), tick trefoil (*Desmodium*) of several species, fireweed (*Epilobium angustifolium*), false foxgloves (*Gerardia flava* and *G. laevigata*), fringed loosestrife (*Steironema ciliatum*), wood betony (*Pedicularis canadensis*), arbutus (*Epigaea repens*), pyrola (*Pyrola elliptica*), four-leaved loosestrife (*Lysimachia quadrifolia*), pearly everlasting (*Anaphalis margaritacea*), bottlebrush grass (*Hystrix patula*), pipsissewa (*Chimaphila umbellata*), pink and yellow lady slippers (*Cypripedium acule* and *C. pubescens*) and red wood lily (*Lilium philadelphicum*).

In late summer, among the plants of the forest floor are numerous fungi, growing either from old logs and stumps or on the ground itself. These fungi may have some indirect relation to bird life in that some of the numerous insects that feed upon them may be food for birds. Their varied forms and colorings make them an attractive part of the forest life. Many are good edible species, and will furnish the camper who dares to gain a knowledge of them and use it, with many good meals. On old logs and stumps, such genera as *Fomes*, *Polyporus*, *Fistulina*, *Daedalca*, *Pleurotus* and *Pluteus* are represented. On the ground grow not only the poison-

ous *Amanita*, but many edible species of *Collybia*, *Clitocybe*, *Russula*, *Lactarius*, *Boletus*, and woodland forms of *Agaricus*.

OVEN-BIRD. *Sciurus aurocapillus* (Linn.)

This bird, which is only slightly smaller than the English Sparrow, is of a uniform olive-brown color on the back and wings. The brown of the head is dull orange with a blackish stripe on either side. The under parts are whitish, spotted or streaked on the breast and sides with black.

The Oven-bird is abundant in both types of forest in the Park. It lives on the ground or among the undergrowth and lower branches, preferring forest that is open and without dense underbrush. When on the ground it walks in a deliberate manner, not like the walking sparrows, but more like a game bird, or a hen in the barnyard. This habit alone will mark it at once and should help to identify it as readily as its coloring, which is not as brilliant as most of the other warblers.

Its singing is the well-known "teacher" song. Preferring not to put English words to bird songs, but to write them as they really sound, I should translate it as "kadee kadee kadee kadee kadee," the second syllable higher pitched than the first, longer in time, and accented. The whole song usually becomes louder as the bird proceeds. A very different song, to be heard more commonly in early summer than in spring, is usually given in flight, and is less easily described. It is a varied, warbled strain, running up and down in pitch and hardly ever twice alike. In the middle of it the bird usually interpolates two or three of the "kadee" notes, then pauses an instant as though out of breath, before finishing the song.

The nest is placed on the ground in the forest, and is arched over the top, its shape resembling an old-fashioned oven, giving the bird its name. It is difficult to find unless by accident, when one almost steps on it; and the little mother, like many other ground nesters, runs away with a wing dragging as though badly hurt.

SLATE-COLORED JUNCO. *Junco hyemalis hyemalis* (Linn.)

This little bird, a trifle smaller than the English Sparrow, is easily identified by its plain gray back and breast, and the white outer tail feathers and white under parts. The female is browner than the male, and juveniles are streaked on the breast; but all show the characteristic white in the tail.

This is a common bird in the maple and beech forest of the Park, being found most commonly about the edge of the forest or along roadsides. It lives and gets its food on the ground or amid the undergrowth and lower branches of the trees.

The song of this bird is a simple trill, usually all on one pitch. It is quite similar to that of the Chipping Sparrow but rather more musical, and never, so far as my experience goes, with notes so fast that they cannot be counted. The bird also has characteristic call notes, the commonest sounding like "tetete" and the other a short "tsip" used when the young or nest are threatened.

The nest of the Junco is placed on the ground, usually in the side of a bank, and in a hollow so that the rim is level with the ground. It is often most attractively situated among mosses, ferns and woodland plants. The nest shown in the illustration (figure 83) was found in Quaker Run Valley, in a pasture close to the edge of the forest. Another nest was discovered on Limestone Brook, and a third was shown me above Frecks at the camp of the Buffalo Society of Natural Sciences.

RUFFED GROUSE. *Bonasa umbellus* (Linn.)

This bird is not easily mistaken for any other, it being the only one of the true game bird group occurring naturally in the Park. It is mainly mottled brown above and lighter beneath, and somewhat smaller than the Crow. The roaring noise of its wings when it is flushed in the woods is also sufficient identification.

This bird is quite common in nearly all forested areas in the Park. It is perhaps less frequently found in the mature timber but such areas are small and scarce. It lives on the ground in the forest, occasionally perching in the lower limbs of trees.

Aside from the noise made by the wings in flight this bird has several call notes. A "tuck-tuck-tuck-tuck" as slow and measured as the ticking of a clock, is the call of a mother bird to her brood. When the young are in danger the mother produces a whining noise as though in pain, and runs away dragging one wing. In spring the male produces the loud drumming with his wings, a sound so low in pitch one seems to feel rather than hear the vibrations. This drumming is accelerated in time, beginning with slow beats, and ending in a long roll.

The nest is placed on the ground in the forest, usually at the base of a tree or stump. Broods of young accompanied by the mother bird, were observed commonly in the Park in early July.

Since the sub-species of this bird in the Park is questionable, I have left the name in binomial form.

WOODCOCK. *Philohela minor* (Gmel.)

This bird, a little longer than the Robin, and with a decidedly heavier body, may be known by its long bill and mottled brown and black back. It could hardly be mistaken for any other bird, the smaller size, longer bill and peculiar wavering flight separating it immediately from the Ruffed Grouse.

The Woodcock is well distributed in the forested areas of the Park. It prefers woodland where the ground is moist and soft, but this applies to many places other than the stream border areas, and it seems to be commoner in the forest than along streams.

This bird has a number of notes, some vocal and some made with the wings. In early spring it indulges in a remarkable spiral flight in the evening twilight, the wings making a curious winnowing sound. Some vocal performances accompany this, particularly a call "peent" which prefaces the flight and sounds much like the call of the Nighthawk.



Fig. 79. The maple and beech forest, showing characteristic undergrowth and old logs, an environment that attracts certain birds. Yellow birches in foreground.



Fig. 80. Heavy mature forest in the Big Basin, near head of Stoddard Creek. Home of the Hermit and Olive-backed Thrushes, and the Winter Wren.



Fig. 81. A view of the forest floor, the favorite haunt of Oven-bird, Ruffed Grouse, Whip-poor-will, Junco, Winter Wren, Woodcock and others.



Fig. 82. The forest floor, with dense carpet of shade-loving herbs, ferns and vines. Here, one would expect to find the shy Hermit Thrush and elusive Winter Wren.

The nest is a hollow on the ground in the forest, usually containing four eggs. The female sits very closely on her eggs. The finding of nests and downy young in the Park is reported by several persons.

WHIP-POOR-WILL. *Antrostomus vociferus vociferus* (Wils.)

This bird is likely to be known to the Park visitor mainly if not entirely by its voice. Rarely one sees a bird in the forest, by almost stepping on it, whereupon it flies to some nearby limb, on which it perches lengthwise. The mottled plumage, long wings and noiseless flight easily identify it. Only the Nighthawk is at all like it, and that bird is not likely to be found in the forest.

How common the Whip-poor-will is in the Park it is hard to say. I did not happen to see a single individual, and did not explore much of the Park area at night when it is most often heard. In July one or more birds were always to be heard on the hillsides near Tunesassa (Quaker Bridge).

The call of this bird has given it its common name. It is repeated over and over with perfect rhythm. There is considerable variation but all the birds I heard in the Park sing with the first note medium in pitch, the second low, and the last high and not slurred.

The Whip-poor-will makes no nest, but lays its two mottled eggs on the ground in the forest, where they are likely to be found only by accident.

WINTER WREN. *Nannus hiemalis hiemalis* (Vieill.)

The Winter Wren is even smaller than the House Wren, with a shorter tail and rounder body. The color of the back is a richer brown, barred with dark brown on wings and tail. The under parts are also brown, but somewhat lighter.

This little bird is rather rare in the Park. I met with but two, one near English Run, perhaps a female, for it did not sing; and the other in the Big Basin, a male that sang its delightful, rapid, bubbling song over and over again. The bird frequents dense, dark forests where it lives among the old logs and roots of wind-falls, seldom going far above ground.

The song is varied and longer than most bird songs, and delivered in a high, sweet voice that does not seem loud, but carries a considerable distance. It is quite varied in both pitch and time, but usually contains a long trilled note in the middle or near the end, that suggests a note of the canary. While hardly to be ranked with the thrushes this bird is one of the finest singers in the forest, far ahead of the warblers or the vireos. The song belongs to the deep cool shade of the forest, and suggests to the bird lover who associates sounds with places, old moss-covered logs and a forest floor covered with fern, partridge berry, goldthread and wood sorrel.

The nest of this wren is hidden in a crevice of an old stump or the roots of an overturned tree. It is made of twigs and moss and lined with feathers.

Birds of the Forest Undergrowth. The undergrowth of the forest is attractive to many birds that neither live much on the ground nor range up to the tops of the trees. This undergrowth consists partly of young trees of the same species as those forming the main forest, and partly of smaller trees and shrubs (figure 84).

The species of small trees and shrubs found in both types of forest are witch hazel (*Hamamelis virginiana*), flowering dogwood (*Cornus florida*), hornbeam (*Carpinus caroliniana*), and the raspberries and blackberries (*Rubus*). In the maple and beech forest, hobblebush (*Viburnum alnifolium*), maple-leaved viburnum (*V. acerifolium*), shad bush (*Amelanchier canadensis*), striped maple (*Acer pennsylvanicum*) and moosewood (*A. spicatum*) are characteristic. In the oak and chestnut forest, sassafras (*Sassafras variifolium*), which seldom reaches tree size here, bush honeysuckle (*Diervilla lonicera*), silky dogwood (*Cornus Amomum*), beaked hazel (*Corylus rostrata*), wild currant (*Ribes*), poison ivy (*Rhus Toxicodendron*), sweet fern (*Comptonia peregrina*), thimbleberry (*Rubus odoratus*) and mountain laurel (*Kalmia latifolia*) are found.

BLACK-THROATED BLUE WARBLER. *Dendroica caerulescens caerulescens* (Gmel.)

Nearly all of the Warblers are strikingly colored birds, and while the male Black-throated Blue is not as brilliant as some other members of the family, none presents a neater appearance, or a daintier contrast of pleasing colors. He is grayish blue above, somewhat darker than the Parula or Cerulean, and enlivened by a spot of white on the edge of the wing and other spots on the outer tail feathers. The throat and sides of the breast are black and the under parts pure white. The female is less like her mate than in the case of most other warblers. She is plain dull greenish above and yellowish white beneath, with only a small white spot on the edge of the wing to suggest her relationship.

This is one of the common forest birds of the Park, well distributed through the maple and beech forest and occasionally found also in the oak and chestnut. It lives in the low bushes and small trees forming the undergrowth of the forest and for that reason is more likely to be easily seen than any other forest warbler; but it is really a little less common as revealed by its song, than the Black-throated Green and Magnolia.

The song of the Black-throated Blue is short, slow in time, and delivered in a peculiarly husky voice. There are usually but four notes, the first three even in pitch and the last drawling slowly upward. It may be written "shree-shree-shree-shree-ee-ee."

The nest is a cup-like structure, built of bark, leaves and fibres, and placed in a bush or small tree only a few feet from the ground. In most places it is said to prefer such evergreen species as mountain laurel and rhododendron, but since both these shrubs are decidedly scarce and local in the Park this cannot be the case here.

HERMIT THRUSH. *Hylocichla guttata pallasi* (Cab.)

The Hermit Thrush is only a little larger than the English Sparrow. Its upper parts are uniform olive-brown, except the tail, which is abruptly reddish brown, the best field mark by which to identify it. The under parts are white, spotted on the breast with dark brown spots, smaller than those on the Wood Thrush, about the same as those of the Olive-back and darker than those of the Veery. The young are similar to the adults, but streaked with buff or whitish on the back.

This is the commonest and most widely distributed thrush in the Park, found nearly everywhere in the maple and beech forest, but noticeably not found in oak and chestnut nor where the Wood Thrush occurs, though there may be cases where there are Wood Thrushes on one side of a stream valley and Hermit Thrushes on the opposite slope. It lives in the lower branches and underbrush of the forest, and is much more frequently heard than seen.

The Hermit Thrush's song is one of the most beautiful and inspiring of American bird songs. The notes are as clear, sweet and resonant as those of the purest-toned bell. The song consists of phrases of six to ten notes each. Each phrase usually begins with a long low note, and is followed by higher and faster notes, grouped in twos and threes, each group descending in pitch, but usually higher than the last group. Each complete phrase is pitched higher or lower than the one preceding it. An occasional phrase is pitched an octave or more higher than the others, when the notes are less resonant and musical than other phrases of the song. Unlike most bird songs, the low notes are louder and carry farther than the high ones, so that the last notes are often inaudible in distant birds. This Thrush may be heard frequently in the Park in early summer, but ceases to sing in early August, so that visitors who listen for it in the latter part of that month are likely to be disappointed.

The nest of the Hermit Thrush is usually placed on the ground and made of mosses, leaves and roots. The eggs are greenish blue and unspotted.

CHICKADEE. *Penthestes atricapillus atricapillus* (Linn.)

The Chickadee is smaller than the English Sparrow. The top of its head, and a spot on the chin and throat are black, while the cheek space between these marks is pure white. The back, wings and tail are gray, the wings with white-edged feathers. The under parts are dull white, with the sides, in fresh plumage, buff.

The Chickadee is common throughout the forests of the Park and found in both kinds of forest, frequenting the lower limbs of the trees and undergrowth. It is an active little bird, continually flitting about among the branches, usually in small companies in late summer and through the winter. Chickadees are quite tame and confiding, often approaching an observer closely, and may sometimes be induced to feed from one's hand.

The common call of the Chickadee is the well-known "chickadee-dee-dee." It has another call of more whistled quality that

sounds like "tickleweetletoo," and several faint lisping notes. The song is two long sweet whistles, the second about a tone lower than the first in pitch, "phee-wee." This song, if it is truly such, is likely to be heard in any month of the year, though perhaps more commonly in spring than at other times. If one can learn to imitate it closely, the imitation will often bring an answer, and sometimes call the birds close to the observer, even in the winter.

The nest is placed in a hole, frequently one that the birds have excavated themselves in a punky birch stump. In the absence of white birch in the Park, these birds use yellow birch equally well. A number of unoccupied nesting holes were found in stubs of this species. The inside of the hole is lined with soft materials, such as rabbit fur. There are seven or eight young and sometimes even more, a family that keeps the parents busy gathering small insects.

WOOD THRUSH. *Hylocichla mustelina* (Gmel.)

The Wood Thrush is a little smaller than the Robin and a bird of very much the same shape and build. Its upper parts are uniform brown, shading to bright reddish brown on the head. The under parts are white, heavily spotted with large, round, dark brown spots.

This bird is rather locally distributed in the Park, common in some localities and unknown in others, but found in both types of forest. On the whole it is much less common than the Hermit Thrush, and the two species do not appear to occur together. The Big Basin is a Wood Thrush locality. No less than three birds were singing there at once, July 19, and young were noted there on August 1.

The song of this bird is one of the most beautiful to be heard in the Park. Whether it is superior to that of the Hermit Thrush is really a matter of personal opinion; but the true lover of bird music will pause to listen to either whenever the opportunity comes, and never cease to enjoy the sweet notes. The Wood Thrush song may be known by the clear, flute-like phrases of three or four notes each, with pauses between them, each phrase different from the last, the bird singing from three to five different phrases, before it repeats. The phrases are often prefaced or terminated with other notes of less loud or sweet quality, but these notes are only audible when one is near the singer.

The nest of the Wood Thrush is placed in a bush or small tree, usually ten feet or less from the ground. The nest is made of mud like that of a Robin, but is somewhat smaller. The exterior is covered with leaves and the interior lined with roots. The eggs also resemble those of the Robin, being greenish blue, without marks, and only slightly smaller and darker in color.

HOODED WARBLER. *Wilsonia citrina* (Bodd.)

This beautiful warbler is olive-green above and yellow beneath. A patch of black covers the entire throat, upper breast and sides and top of the head, leaving a bright yellow spot about the forehead

and eyes. The outer tail feathers are marked with white. The female is plain olive and yellow with slight traces of the black hood across her breast and on the top of the head. The young are plain olive and yellow with no distinguishing marks in first plumage, and unless the parents are near, they are difficult to distinguish from other olive and yellow warblers.

The Hooded Warbler is distributed in small numbers in many places in the Park, living in the undergrowth and dense bushes in the maple and beech forest. Although it may occur in oak and chestnut woods in the Park I have not found it there. It is not very common anywhere, but where observed at all several males are likely to be in song in that general locality.

The song of the Hooded Warbler is loud and emphatic. Like that of the Chestnut-sided Warbler, the next to the last note is higher in pitch and accented, but the quality and the time are different. The song may be written "Terwee terwee terwee *tee* too." In the Chestnut-side's song the accented note is longer in time than the last, but in the Hooded Warbler's the durations of the two notes are equal, the accent being due to greater intensity. There is some variation among individuals, but the accent of the next to the last note is a general mark of identification for all songs of this species.

The nest of the Hooded Warbler is placed in a bush a few feet from the ground. In regions where laurel grows it is practically always in such a shrub. No nests have been found in the Park, but as the laurel is rare, some other nesting site must be used.

OLIVE-BACKED THRUSH. *Hylocichla ustulata swainsoni* (Tschudi)

The Olive-backed Thrush is between Sparrow and Robin in size and may be distinguished from the other Thrushes of the Park by the uniform olive-brown coloring of the upper parts without reddish or tawny-brown anywhere. The cheeks of the bird are distinctly buffy, and the under parts white, with the usual Thrush spotting on the breast, heavier than the Veery's spots, lighter and smaller than those of the Wood Thrush, and almost the same as those of the Hermit.

The Oliver-back is the rarest of the four Park thrushes. I met with but three birds, one in the English Run valley, and the other two in the Big Basin. Like the other thrushes it lives in the lower trees and undergrowth of the forest.

The song of the Olive-back is sweet and pleasing, with something of the same beautiful qualities that make the thrushes as a group our very best singers; but hardly any observer will consider it equal to any one of the other three thrushes. Its song is less variable than that of the others. It consists of seven to nine notes, the first low in pitch, the remaining notes in pairs, each pair higher than the last one, but the second note of each pair lower than the first. The pairs of notes descend in pitch, but the whole song is ascending. Those who think this song confusingly like the Veery's should note this point, for the Veery's song invariably descends in

pitch. One might write the Olive-back song "oolalolaylallayleeyi," the broader vowel sounds denoting lower pitch. The notes of the Olive-back song are all nearly equal in time, and connected with the other notes without a pause. These points will always distinguish it from the Hermit, whose song is more variable than that of the Olive-back.

The nest of the Olive-backed Thrush is placed in a low bush or small tree, from three to fifteen feet from the ground. It is made of sticks, bark, grasses and roots. The eggs are greenish blue like those of other thrushes; but unlike them are spotted with reddish brown.

Birds of the Forest Trees. The sizable trees constitute the bulk of the forest and are the habitation of many birds. Some species are characteristically birds of the trunks and larger limbs, while others live among the branches and foliage.

The trees growing in the maple-beech forest are sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), hemlock (*Tsuga canadensis*), black birch (*Betula lenta*), yellow birch (*B. lutea*), white ash (*Fraxinus americana*), pin cherry (*Prunus pennsylvanica*), basswood (*Tilia americana*), butternut (*Juglans cinerea*), black cherry (*Prunus serotina*), red oak (*Quercus rubra*) and shag-bark (*Hicoria ovata*). Those constituting the oak-chestnut forest are chestnut (*Castanea dentata*) — which in this region is still only slightly attacked by the deadly blight, white oak (*Quercus alba*), red oak (*Quercus rubra*), pignut (*Hicoria glabra*), butternut (*Juglans cinerea*), common and large-toothed aspens (*Populus tremuloides* and *P. grandidentata*), shag-bark (*Hicoria ovata*), basswood (*Tilia americana*), white pine (*Pinus Strobus*), cucumber tree (*Magnolia acuminata*), bitternut (*Hicoria minima*), and mockernut (*H. alba*), chestnut oak (*Quercus prinus*), tulip tree (*Liriodendron tulipifera*) and black oak (*Quercus velutina*).

The only conifers of the forest are the hemlock and white pine. Conifers are especially attractive to some birds. In the maple-beech forest one will find the Black-throated Green, Magnolia and Blackburnian Warblers more frequently in or near hemlock trees (figure 85). White pine is not abundant in the Park, but in a few places it grows in small groups, making a forest type by itself, though of very small area. Crows and Blue Jays seem to like these clumps of pine. One or two Crows' nests are likely to be found in such clumps. The only Pine Warbler noted in the Park was in such a pine grove. This bird is probably not to be found during the nesting season except where pine occurs.

Species often found in the forest, but not listed under this heading are Mourning Dove, Screech Owl, the Cuckoos, Downy Woodpecker, Flicker, Chimney Swift (flying above), Ruby-throated Hummingbird, Least Flycatcher, Rose-breasted Grosbeak, Chestnut-sided Warbler, Mourning Warbler, Redstart, Veery and Robin.

1. *Birds of Trunks and Limbs.* Under this heading come the birds that live mainly about trunks of trees, getting their food largely



PLATE 28. BIRDS OF THE BRANCHES AND FOREST CROWN

- 1, 2, Scarlet Tanager
(male and female).
3, Red-eyed Vireo.
4, 5, Magnolia Warbler
(male and female).
6, Wood Pewee.
7, White-breasted Nuthatch.

- 8, 9, Black-throated Green Warbler
(male and female).
10, Blackburnian Warbler.
11, 12, Parula Warbler
(male and female).
13, Blue-headed Vireo.

Drawn by Edmund J. Sawyer

from insects and their eggs in the bark or wood, or in crevices on the surface. These birds are of high economic value to the forest as destroyers of such insects, nearly all of which are injurious. Some of them, as the Black and White Warbler for example, live also among the branches and foliage and to some extent forage or nest on the ground.

HAIRY WOODPECKER. *Dryobates villosus villosus* (Linn.)

This bird is about the size of the Robin, and easily recognized by its black and white coloring. It differs from the Downy Woodpecker mainly in size, but also in the unbarred white outer tail feathers. From the Sapsucker it may be distinguished by the continuous white back, the red on the back of the head instead of forehead or throat in the male, and the lack of a large white patch on the edge of the wing.

This is the commonest woodpecker in the forested areas of the Park, occurring in both types of forest. In summer it is not likely to be seen except in forests. It prefers rather open high forests, however, and will not often be found in the younger second-growth.

The commonest note of this woodpecker is a loud sharp "keep," differing from the call of the Downy Woodpecker mainly in its loudness. A longer call is something like the rattle of the Kingfisher, but slurs first upward, and then downward in pitch, while the Kingfisher's call maintains an even pitch.

The nest is placed in a hole in a dead tree or branch in the forest. This woodpecker is probably the most valuable to the forests of any species found in the Park.

WHITE-BREASTED NUTHATCH. *Sitta carolinensis carolinensis* Lath.

The White-breasted Nuthatch is about the size of the English Sparrow. It is light bluish gray on the back and white beneath. The top of the head and back of the neck in the male are glossy black, but in the female, dark gray. The cheeks and sides of the head, up to a line over the eye, are white. The tail is black, spotted with white on the outer feathers and the under tail coverts are reddish brown.

This bird is fairly common in all the forest areas of the Park, but prefers the more open oak and chestnut to the more dense maple and beech. Occasionally it is found all summer in orchards and shade trees. It lives about the larger limbs and trunks of trees, climbing over the rough bark and clinging by means of its strong feet. It does not use its tail for a brace, as the woodpeckers do, so can climb equally well with head up or down, a habit that will easily distinguish it from a woodpecker.

The call note of the Nuthatch is a nasal note sounding like "yank." It has a song indulged for a short time in spring or early summer. This is a series of low notes, all on the same pitch, with a slightly nasal quality, but more nearly a low whistle and more musical than the call note. The sound of it is much like that of the long call of the Flicker when heard from a distance.

The nest of the Nuthatch is built in a hole in a tree, sometimes a deserted woodpecker's nest, but more often, in my experience, a natural crack or cavity. A family of Nuthatches, adults and several young, were found near Limestone, running over the bark of a large butternut tree along the roadside. An old woodpecker hole in a dead limb of this tree was probably their home.

BLACK AND WHITE WARBLER; BLACK AND WHITE CREEPER.
Mniotilta varia (Linn.)

The Black and White Warbler is smaller than the English Sparrow. Its entire upper parts are striped in black and white. The throat and sides of the male are also striped with black, but the female's throat is pure white and her sides either unstriped or only faintly so.

The Black and White Creeper is found in summer mainly in the forest. It is less common in the Park than most of the other warblers, but is well distributed and may be met with anywhere in forested areas. It lives about the larger limbs and trunks of trees, creeping on the rough bark in search of insects, and managing to go with head up or down, like a Nuthatch. It should not be mistaken for the much larger Downy Woodpecker, the center of whose back is white without stripes, and who never goes down a tree head first.

The song of this bird is weak and high-pitched. It sounds like "weesy weesy weesy" repeated eight or ten times, the second syllable of each "weesy" being higher in pitch than the first. More rarely the bird drops one or two of these notes to a lower pitch toward the end of the song. The form suggests the strain of the Oven-bird, and where both species are heard singing near each other in the forest, the Black and White Warbler sounds like a weak, high-pitched echo of the other.

The nest of the Black and White Warbler is placed on the ground at the base of a tree or stump, and the bird often approaches it by creeping down the trunk. Though the nest is on the ground, the bird's environment is more that of trunks, limbs, and undergrowth where it gathers most of its food, than of the forest floor, where in fact it is seldom seen.

YELLOW-BELLIED SAPSUCKER. *Sphyrapicus varius varius* (Linn.)

This Woodpecker, a little smaller than the Robin, is readily known by the red patch on the forehead, and in the male on the throat also. The Downy and Hairy Woodpeckers have red only on the back of the head. The center of the back is barred with black, and the wing shows a broad white patch, visible from a side view when the wing is closed, and a good field mark. Young birds that have no red, may be distinguished by this mark and the dark back. The pale yellow under parts are not usually a good field mark, as the habits of the bird make them inconspicuous.

The Sapsucker is rare in the Park. I saw only one, in the Big Basin on August 1. In summer the bird will be found mainly in forests, particularly those of larger trees.

The voice of the Sapsucker is not often heard. The commonest note is a cat-like "waaow," that reminds me of a similar call of the gray squirrel.

The nest is in a hole in a tree, usually rather high up. While generally beneficial as an insect destroyer, this bird is sometimes harmful, girdling or seriously injuring trees by its habit of drilling rows of holes through the inner bark to get the sap.

NORTHERN PILEATED WOODPECKER. *Phlæotomus pileatus abieticola* (Bangs)

This Woodpecker is unmistakable. Its large size, only slightly smaller than the Crow, its black back, red-crested head, white stripe on the side of head and neck, and white-marked wings are entirely characteristic. The females have less red on the head.

That this Woodpecker occurs occasionally, particularly in the more mature forests of the Park, is unquestioned. Several persons reported seeing it recently in the Park area, but I did not see one myself. Unmistakable signs of its work on the trunks of large dead trees were seen in the Big Basin, at the head of Red House Creek and in Browns Hollow, a tributary of Wolf Run. In the last case the work was fresh.

The call of this bird suggests in time and form the long call of the Flickers. It is louder and of different quality, however, sounding like "ho ho ho ho ho ho" many times repeated. The flight is usually undulatory like that of the other woodpeckers, although the contrary has been stated.

The nesting hole is similar to that of the other woodpeckers but with a larger opening. Places where these woodpeckers have been at work on tree trunks show deep rectangular holes chiseled into the wood, often running up and down the trunk for a foot or more.

BROWN CREEPER. *Certhia familiaris americana* (Bonap.)

In the summer of 1922 the Brown Creeper was added to the list of the summer birds of the Park. A single bird was seen on August 21 in the Big Basin on Stoddard Creek. This species may be easily distinguished from others by its small size, slender curved bill, finely striped brown back, pointed tail feathers, and habit of creeping spirally up the trunks of trees as far as the rough bark extends. It never creeps head downward as do the Nuthatch and Black and White Creeper. Its commonest note is a faint, high-pitched "shree-e-e-e," and in early summer it rarely sings a short, weak song of only four or five notes, suggesting the songs of the weaker voiced warblers.

2. *Birds of the Tree-tops.* Many birds live amid the foliage and twigs of the tree-tops (plate 28 and figure 86). Here they nest and search for their food, which in the majority of cases is insects. Most of these insects are caterpillars, leaf beetles or aphids, all injurious to forests.

The great amount of good these birds do is not often fully appreciated. A single experience in the Park will suffice to illustrate

this. One morning, July 21, just after having discovered my only Cerulean Warbler of the summer, I climbed up a hillside on the south side of Quaker Run. A slight ridge sloping down the hill had been cleared for pasture, leaving the edge of a nearly full-grown forest just below me, where I could look down into the tops of the trees (figure 87) with the morning sun at my back giving me the best possible light for observations. I soon heard and then saw a Parula Warbler, one of the most highly colored birds of this species I have ever seen. This bird caught a small caterpillar on the leaf of a butternut tree, took it to a larger limb where it pounded and then swallowed it. In a moment or two it caught another and repeated the performance. Then a female Blackburnian appeared and did the same thing.

Investigation showed that there were about a dozen butternut trees here, all of whose leaves were infested by caterpillars of some geometrid moth. Many holes had been eaten through the leaves, hardly one of which was without its caterpillar. As I sat below one dropped into the pages of my notebook and got folded between the leaves.

It looked as though the butternuts would soon be stripped of their foliage. But the birds were at work. One after another I found Magnolia, Black-throated Green, Hooded and Black and White Warblers; Red-eyed, Blue-headed, and Yellow-throated Vireos; Juncos; and a female Indigo-bird, all busy gathering caterpillars. A female Magnolia was followed by two young who ate as fast as she could feed them. A Junco was busy carrying her caterpillars to a spot where I suspected there was a nest full of hungry young. The abundance of bright-colored warblers reminded me of a spring morning in May, except for the fact that there were more females and young and singing was less in evidence.

About two weeks later, on August 5, I again visited this spot. Hardly a bird was to be seen and not a caterpillar. The butternuts were far from defoliated, showing no perceptible difference in appearance than formerly. The birds had done their work thoroughly.

RED-EYED VIREO. *Vireosylva olivacea* (Linn.)

The Red-eyed Vireo is about the size of the English Sparrow. It may be distinguished best from other Vireos or the several olive-green warblers by the dark line through the eye, the gray crown, white under parts without any tinge of yellow, and the lack of wing bars. The red iris is not easily made out in the field.

This is the commonest forest bird in the Park and is next to the Song Sparrow and Indigo Bunting in general abundance. It is found mainly in the maple and beech woods, but also occurs in oak and chestnut, and in shade trees—particularly maples—about farms and along roads. It lives amid the foliage, gleaning insect food from leaves and twigs.

The song of this bird is long-continued and persistent. It is made up of short phrases of one to five notes with a short pause

after each. These phrases vary greatly, and a little careful observation will show that each individual bird has twenty-five to thirty different ones, repeating certain of them frequently, but others more rarely. In this respect it differs from the Yellow-throated and Blue-headed Vireos, these latter birds having decidedly less variety. The voice is rather high-pitched, clear and musical, but monotonous in its persistence.

The nest is a beautiful pocket-shaped structure hung from the horizontal fork of a small tree or bush, three feet or more from the ground, but never near the top of a large tree. The nest is made mainly of bark, held together by spider web. Paper is put into it where nests are built near civilization, and the lining is of finer strips of bark.

BLACK-THROATED GREEN WARBLER. *Dendroica virens* (Gmel.)

Close observation of this little bird reveals yellow on the side of the head, with a somewhat dusky line through the eye and on top of the head, and a greenish back. The gray wings and tail are marked with white wing bars and tail spots. The throat is deep velvety black, and this mark extends back along the sides, ending in long, narrow black streaks. The breast and under parts are white. The female is somewhat duller in coloring.

This is by far the commonest warbler of the forested areas in the Park. Like the Magnolia and Blackburnian it shows a preference for hemlock trees, although its foragings are frequently extended to the upper branches of the hardwoods. Living most of the time in the tree-tops, it is more difficult to see than the Black-throated Blue, or even than the Magnolia.

We may most easily know of the presence of this warbler by its song, which has a more musical, ringing quality than most of the warblers, a sound that one soon associates with the forest depths. There are two distinctly typical forms. The first may be written "see see see see too ta," the first four notes of even, high pitch, the fifth note lowest, and the last medium. The other form may be written "see-ee-see-ee-dedeta." The first two notes are long-drawn-out, and the last three quick and short. The pitch varies with individual birds, the two long "sees" being of different pitch, sometimes the first and sometimes the second being lower. The "de de" notes are of even pitch usually, but not always higher than the first two; and the last note is short, low in pitch and often omitted entirely.

The nest of this warbler is most commonly placed in a hemlock tree. It is cup-shaped, made of strips of bark, and built in a fork of the limbs near the top of a small tree, sometimes in a large one, often among the lower limbs. I found such a nest near Limestone Brook, July 27. It contained young birds which the mother was industriously feeding.

SCARLET TANAGER. *Piranga erythromelas* Vieill.

The male of this bird with its brilliant red body and black wings and tail, is unmistakable when clearly seen. The female is less

easily identified. She is plain olive-green above and dull yellowish beneath with no special distinguishing marks. Her size—a little larger than the English Sparrow—and rather finch-like bill will help in identification, as they separate her from the Warblers that are somewhat similarly colored. Male birds in late August are curious looking, being patched in green, yellow and red as they change from summer to winter plumage, while early September birds may have the full winter plumage like the female, save that the wings and tail are black.

The Scarlet Tanager is a common bird in the forests of the Park, despite the prevailing idea that such a brilliant bird must be a rarity. It lives among the tree-tops in both maple-beech and oak-chestnut types of forest. The bird is not always easily seen because of the thickness of the foliage, but once the song is known, a visitor to the Park in early summer will realize how common the bird is.

This song is a rhythmic series of five to nine slurred notes, high-pitched and usually uttered in a rather coarse voice. To the beginner in bird study it may at first seem confusingly like the Robin's song. The rhythm is similar, but it usually lacks the liquid l- or r-like consonant sounds and is of harsher quality.

The nest is built in a low limb of a tree, 10 to 40 feet from the ground. Both nest and eggs look rather like those of the Rose-breasted Grosbeak, but the higher location will usually determine the owner if the birds are not seen.

CROW. *Corvus brachyrhynchos brachyrhynchos* Brehm

The Crow is the largest of common perching birds, being about 18 inches long, or nearly twice the length of the Robin. Its entire body is black, including the rather heavy bill.

This bird is exceedingly common in the Park, and may be seen or heard almost everywhere. It belongs to the forest, since that is where it nests, yet it flies long distances and visits farms, orchards, shade trees and open meadows in its search for food. In the forest it seems partial to pine wherever that tree grows, and any small cluster of white pines in the Park will be likely to contain two or three Crows' nests.

The common "caw" of this bird is well known, yet it is varied considerably. It may be a single short "cah" or a longer "ca-ah" slurred on the end. Various other notes of a guttural, squeaky and rattle-like quality are produced, particularly in spring, sounds not so well known. The bird has no notes that can be called a song.

The nest of the Crow is a large structure of sticks, placed near the top of a tall tree, preferably but by no means always, a pine. Nesting takes place early in the year and is likely to be over or nearly so by the time summer visitors reach the Park.

MAGNOLIA WARBLER. *Dendroica magnolia* (Wils.)

The plumage of the Magnolia Warbler is a veritable 'patchwork' of black, yellow, blue-gray and white. The upper parts are mainly blue-gray with black patches on the cheeks and middle of the back.



Fig. 83. A Junco's nest, hidden amid the grass and buttercups in a pasture close to the edge of a forest.



Fig. 84. Another view in the maple and beech forest, showing thick undergrowth of ferns, shrubs and young trees.



Fig. 85. The branches of a hemlock tree, where one may expect to find the Black-throated Green, Blackburnian and Magnolia Warblers.



Fig. 86. Among the tree-tops,—beech, sugar maple, birch and hemlock,—the home of Vireos, Warblers, and the Scarlet Tanager.

a white line back of the eye, broad patches of white in wing and tail, and a spot of yellow on the lower back. The lower parts are mainly yellow, decorated by a patch of black in the center of the breast, and numerous long black stripes, radiating from this breast patch, down along the sides and under parts. The female is similar to the male, but olive on the back and less brilliantly colored, while the young that are frequently seen in late summer are liable to be something of a puzzle. They are olive above, and yellow beneath, with a yellow spot on the lower back, white wing bars, and a few faint streaks on the sides.

The Magnolia is one of the common summer warblers of the maple and beech forest in the Park, second in numbers only to the Black-throated Green. It is one of the birds that show a decided preference for hemlock trees, though it by no means confines itself to hemlock alone, but gleans much of its food in the upper branches of maples, beech, birch and other broad-leaved trees.

The song of this bird is a short simple strain, often of not more than five notes. The pitch varies considerably in different individuals. Its simplest form may be written "weechy weechy wee." It is louder and stronger than the Black and White Warbler's strain, weaker and less emphatic than that of the Chestnut-side or Hooded. Neither does it have the husky quality that characterizes the Black-throated Blue, or the musical ring that makes the Black-throated Green so pleasing.

The nest is said to be usually placed in a hemlock, often in one of the lower limbs, but the only nest I located in the Park was in a small clump of wild red cherry almost underneath a hemlock, and about five feet from the ground. The last young bird to leave was sitting on the rim of the nest when discovered, and took its first flight as I approached.

BLUE JAY. *Cyanocitta cristata cristata* (Linn.)

This bird is between the Robin and Crow in size. The upper parts are brilliant blue, barred with black and marked with white spots on the wings and tail. The head is crested, and a black mark extends from back of the crest around the neck and across the breast. The under parts are white.

The Blue Jay is well distributed through the Park area, but seems less common than in most other regions I am familiar with. It lives mainly in the forest, but ventures out to more open country occasionally and may be seen in orchards and shade trees.

The Blue Jay is one of the noisiest birds in the woods, yet when it desires it can be so quiet that an observer never suspects its presence. The commonest call is a loud "meeah meeah" of a decidedly harsh quality. Some other notes are of a whistled quality, and still others with a squeaky sound. One call is almost exactly like the scream of the Red-shouldered Hawk. Once in a while a Blue Jay may be found producing a rather low pleasing twitter that is evidently a song, but one not indulged often, possibly only for a brief time during courtship.

The Blue Jay builds a rather large bulky nest in a tree or thick bush, at a height of six to twenty feet or more.

BLACKBURNIAN WARBLER. *Dendroica fusca* (Müll.)

It would be hard to decide which is the most beautiful of the wood warblers, but the Blackburnian, one of the smallest of the group, certainly ranks first in brilliance of coloring, with only the Redstart as a close rival. The male possesses a most brilliant orange throat, fading to yellow and finally white underneath, and striped with black along the sides. The upper parts are mainly black with patches of orange on forehead, crown and cheeks, stripes of duller orange in the back and patches of white in the wing and outer feathers of the tail. The female is similar, with a yellow, rather than orange throat, and of a brownish shade where the male is black.

Wherever there are groups of tall hemlocks in the maple and beech forest one should look and listen for this little Warbler. It is less common there than the other two, the Black-throated Green and Magnolia, and is perhaps more strictly confined to the hemlock, though it wanders occasionally to the tops of the hardwoods.

The song of this bird is best known by the fine, wiry, extremely high-pitched voice. Often, like the Parula Warbler's, it ascends in pitch toward the end; but this is not always true, and the finer quality and higher pitch of the "zee zee zee-ee-e-e" will usually distinguish it.

The nest is built in the branches of a hemlock tree, usually higher than those of the other warblers that make their home in that habitat.

WOOD PEWEE. *Myiochanes virens* (Linn.)

The Wood Pewee is a little smaller than the English Sparrow. It is dark gray above with prominent wing bars of whitish. The under parts are grayish white somewhat darker across the breast.

This bird is found in small numbers throughout the forested areas of the Park. It is perhaps a little commoner in oak and chestnut forest but is found in both kinds. It shows a marked preference for the more open woods and its margin, and is not likely to be found where the growth is dense. It lives among the lower limbs of trees, but not in the undergrowth.

The song of this bird when complete is often written "pee a wee-ee." The three parts are slurred together, the first usually highest in pitch, the second lowest and the last medium. Sometimes the bird sings only the first two notes "pee-ah" and again only the last two "ah-wee-ee." The last note is often given a slight upward slur of about half a tone.

The nest is saddled on a horizontal limb, and is a beautiful structure built of soft materials, lined with bark, and decorated on the outside with lichens. The eggs are marked with irregular blotches on the larger end.

BLUE-HEADED VIREO. *Lanivireo solitarius solitarius* (Wils.)

This bird, slightly smaller than the English Sparrow, is easily distinguished from the other Vireos by the blue-gray head, white mark from the bill around the eye, yellowish sides, and wing bars.

It is well distributed in the maple-beech forests of the Park, but not common anywhere. It seems to be more certain to occur in the few areas of large old trees than in second growth forest. It lives in the tree-tops like the other vireos, where it is difficult to see but easily heard.

The song of this bird is of the same general form as those of the Red-eyed and Yellow-throated Vireos, but distinguishable to a good ear. The phrases are less variable and numerous than the Red-eye's, but they are sweeter and less monotonous in quality. In fact, in sweetness of quality this Vireo is the best singer of its family. The phrases are from two to five notes each, a little slower than those of the Red-eye, and often ending in a sweet soft-toned, slurred note almost like the voice of the Bluebird. The bird lover will find greater pleasure in the song of this vireo than in any of the others.

The nest of this bird is placed in a tree and is similar to those of other vireos. The birds are often quite tame when incubating their eggs and allow a close approach.

PURPLE FINCH. *Carpodacus purpureus purpureus* (Gmel.)

This bird is about the size of the English Sparrow. The male is bright crimson pink on the head and lower back, and lighter pink on the breast. The wings, tail and upper back are brown. The female is brown, with a prominent broad cream colored stripe over the eye, cream colored wing bars, and a gray breast, streaked with brown. The female might be mistaken for the female of the Rose-breasted Grosbeak in the field, but the larger size and heavier bill of the Grosbeak should separate them.

The Purple Finch is not common in the Park, but occurs in small numbers both in the forest and along the stream valleys. Birds were seen in the hills back of Salamanca, in the lower Red House Valley about Tunesassa (Quaker Bridge) and on Limestone Brook. The bird lives in the tree-tops, getting most of its food among the twigs and terminal branches of the trees.

The song of the male is a sweet warble, varying greatly in individuals. It resembles the song of the Warbling Vireo, but is less regular in time and more inclined to contain short phrases of two or three notes repeated several times. The birds have a short call note which sounds like "pink," and is characteristic enough to be used as a means of identification when well known.

The nest is said to be placed in an evergreen, but the Park birds seem to show no great preference for such trees. I suspect that the nest might also be found in broad-leaf trees along the stream valleys in this locality.

NORTHERN PARULA WARBLER. *Compsothlypis americana pusilla* (Wils.)

This beautiful little bird is smaller than the English Sparrow. Its upper parts are a light grayish blue, with a patch of dull yellow in the center of the back, two prominent white wing bars and white spots on the outer tail feathers. The throat and upper breast are yellow fading to white underneath, and the breast of the male is crossed by bands of blackish blue and reddish brown. The extent and number of bands varies with the age of the bird.

The Parula Warbler is found locally in the Park, and is not common. I have met with it in but two places, one on English Run where a single male was seen July 16, about two miles above Frecks, and the other on the south side of Quaker Run not far from the Park's western boundary, where a bird was heard July 11, and at least three males singing July 21. The Parula Warbler lives mostly in the tree-tops of the forest where it is more easily heard than seen. Like other warblers it is an active little bird, hopping or flitting from branch to branch, and giving the observer only a casual opportunity to view its attractive plumage.

The song is high-pitched, shrill, and rather more buzz-like than musical. There are two common forms, but both run upward in pitch toward the end, and sometimes suddenly drop down for a single short terminal note. The first form is a single long buzz of this character, and the second is three shorter buzzes followed by a longer one.

In the nesting season the Parula Warbler is said to frequent places where *Usnea* lichen hangs from the branches of trees, placing its nest in such moss. No *Usnea* has been seen in the Park, and it may be that the Parula does not follow that habit in this region.

RED-TAILED HAWK. *Buteo borealis borealis* (Gmel.)

This hawk, in adult plumage, can always be distinguished by its reddish tail. Its shape and size will distinguish it from all but the Red-shouldered Hawk. The red tail is visible in good light, even when the bird is flying at a distance; for as it sails in great spirals the upper surface of the tail tips toward the observer revealing its distinguishing color when the bird tilts at the outer edge of each circle.

This is the commonest hawk in the Park and may be observed almost daily, while all others were seen only a few times each. It inhabits the forested hillsides but ranges far over the open country in search of food.

The voice of this hawk has a somewhat hissing quality like that of a steam whistle. It calls "ps-see-ee yoo-oo" in a long downward slur, longer than the Red-shoulder's call, and not usually repeated immediately. A rarer call, which I heard along Limestone Brook was of repeated notes, slurred upward, like "oolee oolee oolee oolee."



Fig. 87. A view of the tree-tops along the forest margin,—butternut, black birch and maple,—the characteristic haunt of Red-eyed and Blue-headed Vireos, Scarlet Tanager and various Warblers.



Fig. 88. Cat-tail marsh in the Tunungwant Valley. Home of the Red-winged Blackbird, Sora and Bittern.



Fig. 89. Quaker Run, above Frecks, showing characteristic upland stream border, the home of the Song Sparrow, Veery, Maryland Yellow-throat, and Canada and Yellow Warblers.



Fig. 90. Quaker Run, near its mouth. Dense willow thickets, the home of Song Sparrows, Yellow Warblers, Catbirds, Redstart and Rose-breasted Grosbeaks.

The nest is a bulky mass of sticks in a tall tree. I suspected a pair nesting on a tributary of lower Quaker Run, but did not locate the site. Young birds, most probably of this species, were seen near that point and on the head of Pine Creek July 17 and 20.

BARRED OWL. *Strix varia varia* Barton

This is the only large owl that has been found in the Park. It is easily identified by its large size and round head without ear tufts, a point that will distinguish it from either the Horned or Long-eared Owls that may occur there. The general color of the plumage is grayish brown, barred above, lighter and barred and streaked below.

It is difficult to judge of the abundance of owls in a region, as they sit quietly in thick trees in the daytime and are likely to be overlooked. When smaller birds find them they usually advertise the fact by their excited cries. The two Barred Owls which I saw in the Park were discovered in this way. One in the Big Basin was found July 19 through the cries of an excited Wood Thrush, and the second near Quaker Run, August 5, through the unusual cawing of a flock of Crows.

The call of the Barred Owl is a deep hooting. Several "hoos" are repeated in regular time, with a downward slur on the last, a point that will distinguish it from a possible Horned Owl, whose notes are all on the same pitch, but less regular in time.

The nest is in a hollow tree or in the old nest of a Crow or hawk.

YELLOW-THROATED VIREO. *Lanivireo flavifrons* (Vieill.)

This bird is the most brightly colored of the Vireos, and easily distinguished from others by the clear yellow throat, white wing bars, greenish head, and gray wings and tail.

The Yellow-throat is rare in the Park. I met with it twice on the edge of a forest in the Quaker Run Valley, probably the same bird. It was reported by others in other locations and is likely to be found anywhere in the Park where there are forests or shade trees.

The song of this bird resembles that of the Red-eyed Vireo, but averages lower in pitch, with a peculiarly different quality, and is less variable. The phrases are commonly of only two or three notes each, and the pauses between phrases are longer than in those of the Red-eyed Vireo. Each individual possesses five to nine different phrases. Often for a long time it sings only two or three, repeating them over and over till they become monotonous.

The nest is not distinguishable from those of other vireos.

RED-SHOULDERED HAWK. *Buteo lineatus lineatus* (Gmel.)

This large Hawk is not difficult to distinguish from others except the Red-tailed Hawk, from which it can be separated by the darker reddish under parts, the reddish shoulders and the lack of a reddish tail. Young birds are difficult to identify. The voice will always distinguish the species, however.

It is less common in the forests of the Park than the Red-tail,

and I saw it only four times,—near Red House July 3, on Quaker Run July 18 and August 5, and near Limestone on July 27.

The call of this hawk is a high whistled scream, slurring downward, like “eeoh eeoh eeoh,” often repeated many times, and distinctly different in quality from the Red-tail’s call.

The nest is placed in a tall tree, and is merely a large mass of sticks. This hawk probably breeds in the Park but I have found no nests there. (See p. 350, addendum, for Sharp-shinned Hawk).

PINE WARBLER. *Dendroica vigorsii* (Aud.)

This little bird is the dullest of the yellow-colored warblers. It is dull yellow beneath, olive above, with white wing bars that will distinguish it from most other yellow and olive warblers. The male and female are nearly alike.

The Pine Warbler is rare in the Park, probably occurring only where an accasional clump of large white pine still remains in the deciduous forest. I met with but a single bird, on August 7, in just such a group of pines on the left of the road up Cain Hollow. I had previously visited this place on July 11 without discovering it. The bird was first located by its trill, unexpected at so late a date, but perhaps the autumn period of song was already beginning.

The song resembles those of the Chipping Sparrow and Junco and comprises twelve to fifteen rapid notes, all equal in time, and not especially musical. The pitch varies, the song moving slightly up and down the scale in an irregular manner. This character distinguishes it from either the Chipping Sparrow or Junco.

The nest is built in a pine tree and is constructed of bark, leaves and fibres. It is often at a considerable height from the ground.

BIRDS OF THE MARSHES

Marshes are not common in the Park. Here and there in the stream valleys are small areas that can be classed as such, but only in the Tunungwant Valley are there any large enough to attract marsh inhabiting birds other than the Red-winged Blackbird. Marsh lands are of two distinct sorts,—grass marshes, and cat-tail marshes. They occur along bayous that mark a former course of the stream.

Grass marshes develop where the water is rather shallow, or where the ground is wet but overflowed only part of the year. The characteristic plants comprise the various sedges (*Carex* and *Cyperus*) rushes (*Juncus*), cut-grass (*Homalocenchrus*), water plantain (*Alisma Plantago-aquatica*), arrow-head (*Sagittaria latifolia*), water hemlock (*Cicuta maculata*), blue flag (*Iris versicolor*), marsh violet (*Viola cucullata*), cardinal-flower (*Lobelia cardinalis*) and others. The cat-tail marshes (figure 88) occur where the water is deeper, and consist mainly of the cat-tail (*Typha latifolia*). Beneath the cat-tails grow a few other water plants, such as yellow pond lily (*Nuphar advena*), water pepper (*Polygonum hydropiperoides*), water dock (*Rumex Britannica*) and spearwort (*Ranunculus laxicaulis*).

Marsh birds like both kinds of habitats, but nest more frequently among the cat-tails as they furnish better protection and concealment. Only three species of birds that have been found in the Park properly belong to the marshes, but there are many other possibilities left for future discovery, including the other rails, the marsh wrens, Swamp Sparrow and Least Bittern. Species listed under other headings that often haunt the marshes are Black Duck, Great Blue Heron, Green Heron, Marsh Hawk, Meadowlark and Bronzed Grackle.

RED-WINGED BLACKBIRD. *Agelaius phœnicus phœnicus* (Linn.)

This bird is a little smaller than the Robin. The male is entirely black, except the shoulder of the wing which is brilliant scarlet red, edged with pale yellow. This mark is always visible in flight or when the wing is spread, but may be concealed when the bird is quiet, with wings folded. A singing bird, however, has a habit of spreading the wings and lifting the shoulders, so that in such cases it cannot be mistaken. The female and young are of a plain brownish color, striped above and below.

The Red-winged Blackbird is well distributed in open country in the Park. It prefers swampy areas, and borders of slow-moving streams. Cat-tail marshes are its favorite home, but where there are no cat-tails it is found in open, sedgy marshes, or in bushes and trees along their margin.

The song of the Red-wing has been well represented in its most typical form by the syllables "conqueree," the last note a long trill. The commonest call is a harsh "chack," but when one approaches the nesting site it utters an alarm note "pee-ah" and less commonly a rather mournful "whee-ee-ew."

The nest is placed in cat-tails a foot or two above the water of a marsh, or in a tussock of grass, or more rarely a bush, growing in a marshy situation. Nests were common in the cat-tails about Limestone. They are made of coarse grasses, and the bluish eggs are marked with curious black scrawls and streaks.

BITTERN. *Botaurus lentiginosus* (Montag.)

The Bittern is larger than the Crow, with long neck and legs, and a long, sharp-pointed bill. It may be distinguished from the Great Blue Heron and Green Heron by its brown, striped plumage, and by its size,—smaller than the former but considerably larger than the latter.

It has been found in the Park only in the Tunungwant Valley, where a single bird was seen July 25 and again July 27. It lives in the marshes among the grasses and cat-tails, or about bayous along the stream borders (figure 91).

While the Bittern is usually silent, it sometimes when startled emits a hoarse cry. In spring, in regions where it nests, it makes a curious pumping noise sounding like "pumper lunk — pumper lunk," the sound often being uttered at night and carrying a long distance.

The nest is usually concealed among the cat-tails of a marsh. If this bird is found nesting in the Park it will probably be in such areas in the Tunungwant Valley. It sits closely on its nest, with bill pointing upward, so that the striped neck and long bill blend with the reeds and cat-tails and make it difficult to see.

SORA; CAROLINA RAIL. *Porzana carolina* (Linn.)

This little bird, smaller than the Robin, can be identified by its long neck and legs, large greenish yellow feet, olive-brown back, and gray under parts, with a black mark on the chin and throat. The heavy, labored flight, and the way in which it drops out of sight into the reeds or grass are also characteristic.

The Sora occurs in the cat-tail marshes of the Tunungwant Valley where one was seen and several heard, July 24 and 27. It is a difficult bird to detect when hiding among the cat-tails and it flies only when closely approached.

The voice of the Sora is rather high-pitched and squeaky. One call has been written "kur-wee." Another is a longer call, the notes descending in pitch, while a single short "kek" is sometimes heard.

The nest is placed among the cat-tails or grasses of the marsh, the bottom just above or sometimes in the water. The grasses standing above the nest are often woven together, concealing it and its contents effectually. It probably makes its home in the Tunungwant Valley marshes where the nest or downy black young may some day be found.

BIRDS OF THE WATER MARGINS AND LOWLAND THICKETS

The vicinity of streams and ponds is always attractive to birds. Some birds live their entire lives in or about water. Others are attracted thither from time to time for gleaning food, bathing or drinking. Aquatic animals, insects or plants form the food of some species. Flying insects gather more abundantly near water and attract swallows and others. As a general rule bird life will always be more abundant near water than elsewhere.

In the Allegany Park the water resources consist of brooks (figure 89) and somewhat larger streams, and just outside of the Park, the Allegheny River. The ecology of the stream margin is unusually interesting because of the varied conditions. In general, we can divide the bird life into two divisions,—birds that live along the more open stream border, and birds that live in the thickets of bushes, trees or vines that grow along the stream border.

Birds of the Shoreline and Open Banks. The open stream border consists of the shallow water along the shores, and the shores themselves, whether stony or muddy bars, or steep clay banks. Vegetation is not so much the attraction here as the life in the water or along the shore that furnishes food, and the nesting sites found along the banks.

In the Tunungwant Valley the stream is slower moving, with more muddy shores. Near the stream occur bayous (figure 93),

portions of the former course of the stream now cut off, where the water is more or less shallow. Some of these bayous belong more properly to the marsh type. In others the water is too deep to be characterized as marsh, but is filled with water plants such as arrow-head (*Sagittaria latifolia*) and yellow pond lily (*Nuphar advena*).

Birds found occasionally along open shorelines and bayous, not listed here, are the Bittern, Green Heron, Crow, Red-winged Black-bird and Bronzed Grackle.

SPOTTED SANDPIPER. *Actitis macularia* (Linn.)

This is the only Sandpiper to be found in the Park throughout the summer, and is easily distinguished by its small size—a little larger than the English Sparrow—and its long bill and legs. The long, pointed wings show a white stripe lengthwise when spread in flight. The back is brownish gray, faintly spotted with black, and the breast of adult birds is heavily spotted with the same color.

It is quite common along the shore of the Allegheny River, and also on the larger streams of the Park such as Quaker Run and Red House Creek. It lives on the stony bars that border the stream.

The notes of the Sandpiper are a high-whistled "peet" or "peet-weet." In early summer this is varied by a longer call "weet-weet-weet-weet-weet—peeterweet-peeterweet-peeterweet" sometimes reversed with the "peeterweet" notes first. This long call is uttered by the male as a song, and in a softer, lower voice by the female as a means of calling her young together.

The nest is simply a slight depression in the ground, lined with a few grasses. The three or four dark olive eggs, blotched with black, are large for the size of the bird. The downy young run about soon after they are hatched and look like small gray chickens with abnormally large feet.

BELTED KINGFISHER. *Ceryle alcyon alcyon* (Linn.)

This bird, considerably larger than the Robin, is easily distinguished from all others by the large, irregularly crested head, the long straight bill, and the gray-blue plumage with collar of white about the neck.

The Kingfisher is quite common in the Park, being always found near streams, either sitting on a dead limb or tree in a conspicuous place where it can watch the water; or hovering over the water, or diving into it bill first, for some small fish that its keen sight has detected.

The characteristic note is a long rattle-like call, easily distinguished from those of all other birds, but resembling the long call of the Hairy Woodpecker.

The nest of this bird is made at the end of a long tunnel excavated in the bank of a stream. The openings of several such burrows, probably those of Kingfishers, were seen in banks along Quaker Run and Red House Creek. A brood of young birds just from the nest was seen on Quaker Run, August 4.

ROUGH-WINGED SWALLOW. *Stelgidopteryx serripennis* (Aud.)

The brown back will distinguish this Swallow from all others except the Bank Swallow, and the gray throat and lack of a brown chest band distinguish it from that species. These marks are easily made out in perching birds but are hard to distinguish when they are in flight. With many bird lovers there seems a tendency to overlook this species and speak of all brown-colored Swallows as Bank Swallows, when distinguishing marks cannot be seen. In the Park as well as in most other places, it would be safer to assume them Rough-wings, unless certainly identified as the other species.

This bird is not uncommon in the Park, although less numerous than the Barn and Cliff Swallows. It is a bird of the air, but is commonly to be found where steep clay banks border a stream. It occurs frequently in parts of the Red House Valley, nests in small numbers along Quaker Run, and has been seen west of Limestone.

The commonest note of this bird is not like the twitter of other Swallows, but a single rather harsh, long note. This note is often repeated several times, rapidly.

They nest in a clay bank in a hole either excavated by the birds themselves, or formerly used by a Kingfisher. In some regions they have been found nesting in crevices of stone walls, or the ends of iron pipes. The entrance is usually larger than in the case of the Bank Swallows; and there is likely to be but a single nest or two or three together, rather than a large colony such as Bank Swallows build. Young, out of the nest, were found on July 4 perched in a dead pine along Red House Creek, where the parents were bringing them food.

KILLDEER. *Oxyechus vociferus* (Linn.)

This bird may be easily known by the white collar around its neck and the two black bands across its breast. Its habits are somewhat like those of sandpipers, but its larger size and shorter bill instantly separate it. The lower back shows a cinnamon-colored patch as the bird flies, and the wings are long and pointed.

The Killdeer lives on the stony bars of streams in the Park and along the Allegheny River. It also inhabits open fields, particularly those near streams. I found it common along the river, and a few birds were seen on Red House Creek, Quaker Run, and near Limestone.

The voice of the Killdeer is as characteristic as its plumage. The loud, shrill "kill-dee-ee kill-dee-ee" is well known. When the nest is threatened it produces another note, a trilled "tr-r-r-r-r-r."

The nest is similar to that of the Spotted Sandpiper, but with somewhat larger eggs. The downy young, even when first hatched, are marked with the black breast bands of the adult.

GREAT BLUE HERON. *Ardea herodias herodias* Linn.

This bird may be known by its large size, gray-blue plumage above, and long neck and legs. The head is drawn in and the legs are held outstretched when in flight. Adults have the center of the crown

white, bordered by black lines, but in young birds the entire top of the head is black.

This heron occurs occasionally in the Park, and along the Allegheny River in late summer. It probably does not nest in the locality, all the birds being wanderers from some distant nesting colony. Birds were observed along the river, near Tunesassa on August 3 and near Red House on August 13. Others reported the bird in the Park area along Quaker Run in late July.

The voice of the Great Blue Heron is not often heard. It is a loud, harsh squawk, much lower in pitch than that of the Green Heron. People living near the Park commonly refer to this bird as a "Crane." The true Crane is exceedingly rare anywhere in eastern United States and unknown in this region.

HERRING GULL. *Larus argentatus* Pont.

The Herring Gull may be known by its large size, considerably larger than the Crow, and its long wings, usually somewhat curved in flight. Adults may also be known by the white and light gray plumage, with black-tipped wings. The back and wings are gray, and head and tail white. Young birds are dull grayish brown with black tails, and various intergradations between this plumage and that of the adult are to be found.

This bird occurs as a late summer straggler along the Allegheny River, and has not been seen inside the Park boundary. It probably nests nowhere in the region, and is said to occur along the river mainly when the water is high. Birds were seen there July 13 and 30, both times after a heavy rain the day before had somewhat swollen the river.

The voice of this bird is loud, high-pitched and shrill. The commonest call sounds like "keeyo keeyo keeyo," but it has a great variety of other notes.

BANK SWALLOW. *Riparia riparia* (Linn.)

This bird is easily told from all its relatives except the Rough-wing by its plain brown back. The white throat and the brown chest band distinguish it always from the Rough-wing, as even young birds fresh from the nests possess this mark.

The Bank Swallow is rare in the Park. Whether it nests there or not is uncertain. No nesting colony was found, and observations were limited to three birds near Limestone, one on July 23, and two on July 26. There may be a colony somewhere in that vicinity from which these birds had strayed. Where a colony is found many birds are likely to be seen in the immediate vicinity.

The notes of this Swallow are rather harsh like those of the Rough-wing. There is, however, a difference between the notes of the two species, not easily described yet distinct when once learned.

The nest of the Bank Swallow is built in a hole in a clay or sand bank along a stream border or in an old clay pit, or cut along a railroad or highway. The birds always nest in colonies, often large ones, with the openings of the nests quite close together, so that the bank appears riddled with holes. The entrances to the nests are

BLACK DUCK. *Anas rubripes* Brewst.

The Black Duck is the only species of duck at present known in the Park in summer. It may be distinguished by the general blackish color, with white wing linings showing in flight. The bluish speculum of the wing is difficult to see in the field, but the lack of a white border as well as the general darker color will distinguish it from a female Mallard, should that duck occur in the Park. Ducks may be known from Herons when in flight by the outstretched neck.

The Black Duck has not been found in the Park area itself, but a flock of these birds was seen on the Allegheny River near Cold Spring, July 15. It is likely to occur along the larger streams in summer, and may nest somewhere in the area.

The common note is a "quack" not noticeably different from that of the domestic duck. It also makes a whistling noise with the wings when in flight.

The nest is hidden in tall grass or bushes on the ground, usually near water. The eggs are dull greenish white or buff color and six to twelve in number.

BALD EAGLE. *Haliaeetus leucocephalus* (Linn.)

This great bird is unmistakable in adult plumage. The blackish brown body and wings, and pure white head and tail are easily made out from a long distance. The Osprey, sometimes mistaken for it, although really very different, has the white head marked with black lines and lacks the white tail. Young birds are entirely blackish brown and might be confused with the dark phases of some of the larger hawks.

A single adult bird of this species was seen along the Allegheny River near the mouth of Wolf Run on August 2. Evidently the same bird, for a feather was missing from the right wing in each case, was seen near the mouth of Quaker Run on August 5. Others reported seeing an Eagle in this vicinity, mainly along the river, but two reports were from upper Quaker Run within the Park area, where I did not see it personally. Whether the bird belongs to the northern or southern race could not be determined, so I have left the name binomial in form.

The voice of the Eagle is not often heard. It is high-pitched and shrill, several notes in quick succession, and is said to be different in the two sexes. I have never heard it except from a captive bird whose sex was doubtful.

The nest of this bird, a large mass of sticks, is placed in a tall tree or on a cliff. If any should be found in the Park, it would be in a tree, as there are no cliffs there.

Birds of the Stream Thickets. In the more moist ground that borders streams of the Park, vegetation is of a different character than elsewhere. Bird life in such places is correspondingly different, some species occurring only in such areas and others being more common there.



Fig. 91. Bee balm flowers; a special attraction for the Hummingbird in Allegany Park.



Fig. 92. Turk's-cap lilies. Occasionally visited by Hummingbirds in the Park.



Fig. 93. Bayou in the Tunungwant Valley, showing yellow pond lilies and other swamp vegetation. Haunt of Green and Great Blue Herons, and Bittern.



Fig. 94. One must study his birds quietly, avoiding quick motions and keeping all his senses alert. View in oak and sassafras woods west of Wolf Run.

While there are many trees growing along the streams, there are no areas of forest. Most of the stream border vegetation is to be classed as thicket consisting mainly of shrubs and vines with open spaces between, grown with grasses and tall herbaceous plants (figure 90).

The trees of the stream border are chiefly elm (*Ulmus americana*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), yellow birch (*Betula lutea*), buttonwood (*Platanus occidentalis*), several willows (*Salix*) and an occasional swamp white oak (*Quercus platanooides*). Other species of trees often grow near the river or other streams but generally only where the true forest types approach the margin of the stream.

Shrubs found along the streams comprise willows (*Salix*) of several species, elder (*Sambucus canadensis*), alder (*Alnus rugosa*), red and black raspberries (*Rubus strigosus* and *R. occidentalis*), blackberries (*Rubus*) of several species, wild roses (*Rosa*) and arrow-wood (*Viburnum dentatum*). The vines that climb over these shrubs and help to produce dense thickets that form the nesting sites for most of the birds of this association are river grape (*Vitis vulpina*) and virgin's bower (*Clematis virginiana*).

The herbaceous plants of the stream border comprise numerous species, some of which are especially attractive to birds as furnishing nesting sites or food supplies, others having perhaps no special relation to bird life. These species in approximate order of abundance are sedges (*Carex* and *Cyperus*), pale and spotted jewelweeds (*Impatiens pallida* and *I. fulva*), sensitive fern (*Onoclea sensibilis*), New York fern (*Aspidium noveboracense*), bee balm (*Monarda didyma*), tall meadow rue (*Thalictrum polygamum*), interrupted and cinnamon ferns (*Osmunda Claytoniana* and *O. cinnamomea*), Joe-Pye weed (*Eupatorium purpureum*), turtlehead (*Chelone glabra*), dog violet (*Viola canina*), monkey flower (*Mimulus ringens*), ostrich fern (*Onoclea struthiopteris*), nettles (*Urtica*), boneset (*Eupatorium perfoliatum*), Canada and Turk's-cap lilies (*Lilium canadense* and *L. superbum*), cardinal flower (*Lobelia cardinalis*), fringed loosestrife (*Steironema ciliatum*), false hellebore (*Veratrum viride*) and skunk cabbage (*Symplocarpus foetidus*).

In addition to the birds listed in this association, the following species, discussed elsewhere, also occur: Woodcock, Downy Woodpecker, Flicker, Kingbird, Least Flycatcher, Crow, Cowbird, Red-winged Blackbird, Baltimore Oriole, Bronzed Grackle, Towhee, Indigo Bunting, Cedar Waxwing, Warbling Vireo, Brown Thrasher and Robin.

SONG SPARROW. *Melospiza melodia melodia* (Wils.)

This bird, about the size of the English Sparrow, is best identified in the field by the streaked breast with a large dark spot in the center, heavy streaks on either side of the throat, and the lack of wing bars.

The Song Sparrow is, I believe, the commonest and most widely distributed bird in the Park. While it belongs primarily to the stream valleys, it is likely to be found everywhere except in the forest itself. The bushes along streams are its favorite habitat, but open meadows, wet grassy marshes, thickets, and the edges of orchards or forests are all likely to have Song Sparrows inhabiting them.

This bird is well named. While not the best singer in the Park, its song is decidedly pleasing, more variable perhaps than that of any other bird, and has a wide range in pitch. It sings more persistently and continuously than any other species. The song is more musical than that of the Savannah, Grasshopper or Chipping Sparrows, more varied in pitch than that of the Field Sparrow, and begins with shorter, quicker notes than that of the Vesper Sparrow. Perhaps the commonest form of song begins with three short notes on the same pitch, followed by a trill on a different one, but there are many other forms of beginning.

The nest is most commonly found on the ground in a tussock of grass or beneath a bush. It is sometimes in a bush a few feet from the ground.

MARYLAND YELLOW-THROAT. *Geothlypis trichas trichas* (Linn.)

This little bird, considerably smaller than the English Sparrow, may be known by the dark olive back, bright yellow throat, and black mask-like patch about its eyes. The upper side of this black patch is bordered by light gray and the under parts shade to dull white. The females and young are liable to be a bit puzzling, in plain olive and yellow and without the distinguishing black mark. The female should not be confused with the Nashville Warbler, a bird I have not found in the Park, although it may occur there.

The Maryland Yellow-throat is abundant in the Park, inhabiting the dense growth of willows and other shrubs found along the stream borders, and also common in thickets, particularly those of somewhat moist soil. They are particularly fond of tangles of thorny bushes, such as blackberry, raspberry and wild rose.

The song of this bird is distinctive. It is composed of three or four repetitions of a phrase of from three to five notes. This phrase varies up or down in pitch, and one note of it is usually strongly emphasized. The common interpretation "witchery, witchery, witchery" represents a song of three-note phrases, the first accented. This song sounds to me more like "witatee witatee witatee." Another song of four phrases, the second accented, may be represented by "terawitatee" repeated, and another accented on the last note "titawittee." Many other variations will be noted by observers, but they all bear a strong resemblance to one another. Once the song is well known, it cannot easily be mistaken for that of any other bird. There is a slight resemblance to the less regular song of the Canada Warbler, but not sufficient to confuse the birds if one's ear for bird songs is good.

The nest of the Yellow-throat is placed on or very near the

ground, at the base of a bush, in a tangle of blackberry or in a tuft of sedge grass. It is made of grasses and leaves, and lined with fine grasses. When the young are out of the nest, the parents become anxious at the approach of an intruder, and advertise the fact to the knowing bird lover, who may find the young ones by a little patient waiting.

CATBIRD. *Dumetella carolinensis* (Linn.)

The Catbird is a little smaller than the Robin. Its plumage is plain gray, both above and below, with a black crown on the head, and a patch of dark reddish brown on the under tail coverts. It is a rather short-winged and long-tailed bird with a long sharp, slightly curved bill.

The Catbird is common in the Park, living in thickets and low dense shrubbery, particularly where they grow along streams. It is not a difficult bird to see, for it is often curious enough to come out into view to watch man as much as he may like to watch it. When concealed in the thick bushes its presence may often be known by the harsh, cat-like "mew."

The song of the Catbird is long continued and much varied. It is made up of short phrases with pauses between them. It is usually musical, but some notes may be harsh or nasal in quality. Frequently an individual interpolates into its song, portions of the songs of other birds; a phrase from the Wood Thrush, a few "teachers" from the Oven-bird, a perfect "whip-poor-will," and various other imitations. There is, however, little danger of mistaking the Catbird for some species that it imitates, for its imitations are mixed in with characteristic notes from its own song.

The nest is seldom more than three or four feet from the ground. It is placed in a thick, thorny bush or tangle of vines, and is constructed of sticks and leaves, and lined with fine roots. The eggs are dark greenish blue, unmarked or spotted, and usually four in number.

YELLOW WARBLER. *Dendroica æstiva æstiva* (Gmel.)

This is one of the best known members of the Warbler family. It is smaller than the English Sparrow, with a bright yellow color over most of its body, this yellow being somewhat duller on the back, wings and tail. The breast of the male is streaked with bright brownish red, but that of the female is unstreaked.

Unlike most of the warblers this bird is not to be found in the forest, but inhabits the willow and elder bushes that border streams. It is common along the banks of the Allegheny River and in all the lower stream valleys in the Park.

The song of the Yellow Warbler is a short, pleasing strain, although this bird, like most of the warblers, does not rank high as a singer. The song varies considerably, but the commonest form heard in the Park consists of four or five notes of even time and pitch, followed by three or four more of shorter time and slightly lower pitch, and terminating in a single note of the same time and

pitch as the first notes. It might be written "swee-swee-swee-sweete-te-swee."

The majority of Yellow Warbler nests are placed in elder bushes four or five feet from the ground. I have occasionally found them lower than this in a wild rose, or as high as ten feet in a small elm tree. The nest is woven into a crotch, and made mostly of plant fibres of a silvery whitish color. The four or five creamy white eggs are beautifully wreathed with dark spots about the larger end.

VEERY; WILSON'S THRUSH. *Hylocichla fuscescens fuscescens* (Steph.)

The Veery may be distinguished from the other thrushes by the uniform light tawny brown of the upper parts and the faint light brown spots on the nearly white breast and throat. The spots of the breast are so light as to be invisible a short distance away, and the bird in the dim light of a dense thicket appears to be pure white and unspotted beneath.

It is fairly common in the denser and more wooded stream borders of the Park, living in somewhat swampy woods or willow thickets. Unlike the other thrushes it is not found in the hillside forests, except where there are streams. It is quite common about Frecks and at other points in the Park characterized by lowland thickets.

The Veery is a beautiful singer, with a song quite unlike those of the other Thrushes. It consists of four to six phrases repeated rapidly "wrreeo-wrreeo, wrreeo, wrreeo," each phrase descending in pitch, the latter phrases beginning and ending on slightly lower pitches than the first. There is an unusual, weird, resonant quality to the song that gives it much of its charm. This bird sings less frequently than the other Thrushes and ceases earlier in the summer. After the song period it may be found by its call note, a short "wheo," which when imitated successfully will often bring the bird near enough for observation.

The nest is placed on the ground in wet woods or thickets, in or under a tuft of grass, or in a clump of ferns or some similar situation. The nest is attractive looking, woven of strips of bark and leaves, and containing three or four deep greenish blue, unspotted eggs.

CANADA WARBLER. *Wilsonia canadensis* (Linn.)

The beautiful little Canada Warbler differs from most of the other yellow-breasted Warblers in that the color of the upper parts is bluish gray and not olive. The bright yellow under parts are crossed on the lower throat by a band of black streaks, arranged like a necklace. The yellow extends upward on the side of the head to form a ring around the eye. The forehead of the male is spotted with black, and the black necklace of the female is fainter and less easily perceived than that of the male.

This bird is well distributed in the Park, but not especially common anywhere. I met with it most often in the thickets along Quaker

Run, particularly about Frecks, but it is also to be found on Red House Creek, Wolf Run and Limestone Brook, and probably other places. It prefers thickets of willow and elder that grow along streams, and is characteristic of the stream border type.

The song is loud and clear and made up of short, quick notes, varying up and down in pitch. At intervals certain notes are accented. There is a suggestion in the song of that of the Maryland Yellow-throat, but the rhythm is never so regular, and one may always feel sure that while the bird sounds something like a Yellow-throat, it is not that species. There is enough variation so that syllables written for the song of one bird, are not likely to fit the song of many other individuals. Thus Silloway ('20, p. 94) writes "chip, chippery, chippery, chippery, chee-teh-chee" for the song as heard in the Palisades Park. A song I heard in the Allegany Park was written "chip e wah chee taychee chip e wah," the two "chee" notes being highest in pitch, but the "tay," though low, loud and accented.

The nest is hidden on the ground, under the roots of a bush or in a bank. It is made of leaves, bark, moss or roots, and contains four or five spotted eggs.

RUBY-THROATED HUMMINGBIRD. *Archilochus colubris* (Linn.)

This bird is easily identified by its diminutive size; its long, slender bill; its quick darting flight,—now poising in the air, now darting to another spot so quickly that the eye can hardly follow; and the humming noise produced by the little wings, moving so rapidly as to be visible only as a blur. The metallic colorings,—green, white, and in the male, red,—are less valuable field marks than the shape and the habits of flight, for under different light conditions they appear to be various colors.

The Hummingbird is quite common in the Park, in fact more so than in any other region I am acquainted with. It inhabits mainly the edges of forest and thicket growths along the streams. In such places the bee balm (*Monarda didyma*, figure 91) grows commonly, and it may be the abundance of this flower that accounts for the abundance of Hummingbirds. The birds may frequently be seen hovering about the flowers. Several times I saw birds the top of whose heads appeared golden yellow, so covered were they with the pollen of this flower, the stamens and pistil of which are arranged so as to brush the head of the visiting hummer. In the Tunungwant Valley the cardinal flower (*Lobelia cardinalis*) is common, and is another favorite of the Hummingbird. This flower, though in no way related to the *Monarda*, is also red in color, with stamens and pistils similarly arranged to brush the bird's head and in that way insure pollination. A third flower sometimes visited was the Turk's-cap lily (*Lilium superbum*, figure 92) but this flower only dusts the hummer's breast with its dull red pollen, and it seems more commonly visited by butterflies than Hummingbirds.

The Hummingbird has no song, and only a few squeaky notes not

commonly heard. Its nest is a beautiful structure of soft materials such as fern wool, saddled on a horizontal limb, and decorated on the outside with lichens. Two nests were found in the Park, one on Quaker Run, July 14, and the second in the Tunungwant Valley, July 22. Both nests contained young, and I watched the mother bird feeding them by the curious process of regurgitation.

GREEN HERON. *Butorides virescens virescens* (Linn.)

This bird is the smallest of the heron family to be found in the Park. In the field it most frequently appears to be blue or greenish blue, but actually the color is green. This color is found on the back, wings and top of the head, while the neck is reddish brown on the back and sides, and white, striped with reddish brown underneath.

It is common in the trees and bushes bordering streams throughout the Park, and may often be seen standing on the bank of a stream or pool or wading in the shallows. When in flight the long neck is usually drawn up, and the yellow legs extended, making it appear not so long-necked a bird as it really is.

The common call of the Green Heron is a high-pitched, loud, and rather squeaky "kuleeup," uttered when the bird is startled from its haunts.

The nest is a flat platform of sticks, placed in a small tree or bush near the stream. When the young are several days old they leave the nest and climb among the tree-tops, often sitting in a row on a branch, awaiting the approach of the mother with food. Such a family of young was observed being fed in a tree on the bank of Wolf Run, July 18.

YELLOW-BILLED CUCKOO. *Coccyzus americanus americanus* (Linn.)

Cuckoos are easily distinguished from other birds by their size, slightly larger than the Robin, their long tails, and plain-colored plumage,—brown above and white below. Separating the two species of Cuckoo, the Yellow-billed and the Black-billed, is more difficult. When perching, the former may be known by the large white spots on the under side of the tail, the yellow-colored bill, and the lack of red about the eye. When flying, the cinnamon-brown color that flashes in the wings will distinguish it.

This bird is fairly common in the Park, occurring most frequently in trees or bushes along the stream border, but also in thickets and along the edges of forests. Cuckoos are not always easily seen, but judging by its notes the Yellow-billed was a little commoner than the Black-billed species.

The commonest call of this Cuckoo is a long one, like "cuk-cuk-cuk-cuk-cuk-cuk-cuk-cow-cow—cow," with the time retarded at the end. Not only the time of the call, but the quality of voice in this bird differs from that of the Black-billed Cuckoo, being harsher and the notes less like a gurgle.

The nest of this bird is usually hidden in a thick bush or tangle of vines. It is made of sticks, and is poorly constructed and almost

flat. The eggs are unmarked and lighter blue than those of the Black-bill.

BLACK-BILLED CUCKOO. *Coccyzus erythrophthalmus* (Wils.)

This bird is very similar in general appearance to the Yellow-billed Cuckoo, but may be distinguished by the black bill, smaller white spots on the under side of the tail, red eye-ring, and lack of cinnamon color in the wing when in flight.

It is fairly common in the Park, but evidently slightly less so than the Yellow-billed Cuckoo. It occurs in similar places, in bushes or trees mainly along the stream borders, but to some extent in thickets or the edges of forests.

The notes of this Cuckoo differ from those of the Yellow-billed both in time and quality. They have a soft gurgling sound like "glug" rather than "cuk," and are grouped in pairs or threes repeated at even intervals of time. "Glug-glug—glug-glug" or "glug-glug-glug—glug-glug-glug," with one note of each group accented, and the whole repeated over and over, will represent the song.

The nest, like that of the Yellow-bill, is a poorly made platform of sticks, placed in a thick bush or low tree. The eggs are darker blue than those of the preceding species.

ROSE-BREADED GROSBEAK. *Zamelodia ludoviciana* (Linn.)

This striking bird is slightly smaller than the Robin. The black and white male, with its rose-pink breast and heavy beak can hardly be mistaken for any other bird. The female is brown with a striped breast and rather broad light stripes over each eye. Her coloring closely suggests the female Purple Finch, but her larger size and heavier bill will identify her.

The Grosbeak is widely distributed in the Park, but not especially common. In early July at least three males were in song above Frecks. Other birds were seen in the upper Red House Valley, at Wolf Run and on Limestone Brook, but none was noted near Salamanca. It is an inhabitant of bushy thickets and small trees along streams. It does not live much on the ground as other thicket inhabiting birds do, but mainly in bushes or the low branches of trees.

The song is a beautiful one, exceptionally good for so brilliant colored a bird. In quality and form it suggests the Robin, but is less evenly rhythmic, the phrases usually connected without the pauses that characterize the Robin's song. When pauses do occur they are few, and placed at irregular intervals. A high-pitched, rather squeaky call note, "kink," is also characteristic of this bird.

The nest is placed in a bush, usually from six to twelve feet or more from the ground. It is made of fine twigs or stems, often the curving stems of vines, but is so thin-walled that the contents may usually be seen from below. The eggs are bluish, with reddish brown spots. The male bird, in spite of his bright coloring, assists in the duties of incubation.

REDSTART. *Setophaga ruticilla* (Linn.)

Among the warblers, the Redstart is second only to the Blackburnian in brilliance of coloring. The upper parts, throat and upper breast of the male are black, enlivened by patches of brilliant, fiery orange on the wings, tail and sides of the breast. The under parts are white. The female is soft brown where the male is black, and yellow where he is orange, a more modest coloring than that of her mate, but by no means unattractive. Young males are brown and yellow like the female, but with breast patches beginning to show traces of orange. As they wear this plumage until a year or more old, birds of this sort may often be found singing and sometimes mated and nesting.

This warbler does not seem to be especially common in the Park. It inhabits low growths of thick bushes or small trees, in places where small flying insects, which form a large part of its food, abound. It is an active little bird, flitting about through the bushes, darting out for tiny insects, or spreading its tail in a way that seems designed to show its beautiful markings.

The song is weak, and delivered in a high-pitched, thin voice. It is quite variable in form, "tsee tsee tsee tsee-eet," with an upward slur on the last note being a common form. The bird often indulges the habit of singing two or three entirely different songs, one after the other. The quality of voice will distinguish it better than the form of the song.

The nest is placed in a bush or small tree, usually six to ten feet from the ground. It is similar to those of other warblers. The female incubates the eggs, but when they are hatched both parents take part in feeding the young.

MOURNING DOVE. *Zenaidura macroura carolinensis* (Linn.)

This bird may be identified by its rather large size, a little larger than the Robin, its long tail, with middle feathers longest and outer feathers marked with white, its rather pointed but not narrow wings, and general blue-gray color. Its swift flight, when once known, is also characteristic.

This wild Dove is uncommon in the Park, but mainly found in the trees and bushes bordering streams. It was seen along the Allegheny River, near Salamanca July 3, in the Tunungwant Valley July 23, and near Limestone Brook the same day, where a pair were found feeding on the ground in an open field. One was also heard along Quaker Run on July 9. The birds are most likely to be seen in pairs through the summer.

The voice of this bird is unmistakable. It is a long-drawn-out, slow, mournful cooing, lower-pitched than most bird notes, usually beginning with a higher-pitched note, slurring first upward and then downward, and ending with three or four notes low in pitch and slurred downward. It may be written "ooee-eeah-coo-oo-coo-coo-oo."

The nest of this bird is a flat platform of sticks placed in a bush or tree, sometimes one that overhangs water. Only two eggs are laid, and these are pure white.

TREE SWALLOW. *Iridoprocne bicolor* (Vieill.)

Adults of this bird are easily distinguished by the pure white, unmarked under parts, and the light bluish green or greenish blue upper parts. While most books list this species as a green bird, many individuals are more blue than green and some even a pronounced violet. Young birds are plain brownish gray above and white beneath. They might be mistaken for Rough-winged or Bank Swallows, but the white throat will distinguish them from the first, the lack of a continuous brown chest band from the second, and the grayer back from both.

The Tree Swallow is probably not a nesting bird in the Park, and will not be found all summer. Birds begin wandering southward from their nesting grounds in July and increase in numbers until August. The first bird of this species was seen in the Cold Spring Valley, July 15, and more were seen later at various points. In late summer their number would probably be greatly increased. They live in the open, particularly near water, and perch on wires or the tops of dead trees.

The notes of this Swallow are twitters similar to those of other Swallows, but at times, particularly in the nesting season, the voice is sweeter and more musical than that of any other American Swallow except the Purple Martin.

While they probably do not nest in the Park, it is barely possible that they do. The nest is placed in a hole in a tree or dead stump, or sometimes in a crevice of a building or a bird house. They prefer the edges of lakes or the vicinity of water for nesting. The formation of artificial lakes in the Park and the erection of bird houses near their shores might encourage this species to nest here.

NORTHERN WATER-THRUSH. *Seiurus noveboracensis noveboracensis* (Gmel.)

This bird is quite similar to the Louisiana Water-Thrush, from which it is distinguished by the more yellowish shade of the under parts and of the line over the eye, as well as by the heavier spotting of the breast and particularly the throat.

This is one of the rarer birds of the Park. I met with but a single male bird, first found by hearing the song and tracing it to its source. It was noted singing in the same spot, on Quaker Run near Frecks, for several days early in July and again on August 4. It lives along brooks and streams where willows are dense, and in a somewhat more swampy location than that chosen by the Louisiana Water-Thrush.

While the plumages of the two water-thrushes are much alike, the songs are easily distinguished. That of the northern bird is lower in pitch and faster in time than the Louisiana's. It is more emphatic, but less sweet in quality. In fact, the whole song bears a strong resemblance to the ending of the Louisiana's song; and when both these songs, and the flight song of the Oven-bird are known, a distinct relationship will be noted. The song I heard in

the Park may be written as "wit-wit-wit-wit-wit-wit-tititiwit," becoming faster and lower in pitch toward the end. This song was a fair example of the song of the species, though it varies considerably.

The nest of this bird is hidden under a bank of moss or in the roots of a fallen tree. It is made of moss and rootlets.

SPARROW HAWK. *Falco sparverius sparverius* Linn.

This little hawk may be known by its small size, pointed wings, light reddish brown back, and the black marks about its face. The wings of the male are blue-gray, while those of the female are mainly reddish brown. The more pointed wings and different flight distinguish it from the Sharp-shinned Hawk, even when the colors are not easily made out.

The Sparrow Hawk is not common in the Park. One bird was seen in Cain Hollow, a tributary of Quaker Run, July 11, and a pair were seen in the Tunungwant Valley, July 25 and 27. These birds like the open country for their hunting, but must have dead trees or limbs for nesting holes. They find such conditions in the Park more commonly along streams than elsewhere, where all the birds seen were found, but are also likely to be found in orchards and among shade trees, and hunting over open fields.

The voice of this hawk is high and shrill, the commonest call being a series of rapidly repeated notes, written in most books, as "killy killy killy" but, as I usually hear it, only one-syllabled "keh keh keh keh keh keh."

The nest is in a hole in a dead tree, often one that has been previously used by a Flicker. Such a hole was found in a dead hickory near the place where the pair were noted in the Tunungwant Valley, and was very likely their nesting site, although the birds were not seen to enter it.

LOUISIANA WATER-THRUSH. *Seiurus motacilla* (Vieill.)

This bird, about the size of the English Sparrow, is plain uniform dark brown above with a white line over the eye, the only distinctive marking of the upper parts. The under parts are white, the breast, but not the throat, spotted with dark brown. It is easily distinguished from the Oven-bird by its lack of an orange crown, and separated with more difficulty from the Northern Water-Thrush by the whiter, less yellowish under parts, white eye line and unspotted throat.

This species was found in but one place, and that not within the Park boundary but along the Allegheny River just above Salamanca, where it was noted in song on July 3 and 5. It is probably extremely rare, if it occurs at all within the Park.

It is always found near water, its preferred summer home being the mossy banks and wet stones of a fair-sized brook, where it runs over the ground, flies low over the water, or sits on a wet stone, tilting its tail up and down in a curious manner.

When the bird sings it mounts to the tops of the trees that grow along the stream. The song to my ear has a wild sweetness that

makes it the most musical of the warbler family. "Teweeet-weet weet-titititup up" are syllables that will represent an average sample. The first three notes are high-pitched, measured, and usually slightly slurred upward, suggesting the song of the Scarlet Tanager, in time and pitch, though much sweeter in quality. The remaining notes are quick, short, abrupt, and falling in pitch.

The nest of this bird is well concealed under a mossy bank of the stream. When the female is incubating it can best be located by stamping along the bank and causing the sitting bird to fly out. When young are being fed it may be found by patient watching of the adult birds.

TENNESSEE WARBLER. *Vermivora peregrina* (Wils.)

This little bird may be known by its olive-green back, gray head and white under parts. It should not be confused with the Red-eyed or Warbling Vireos from both of which it can be distinguished by the lighter gray head and sharper bill, and from the Red-eye by smaller size. The lack of a mark in the wing distinguishes it from the female of the Black-throated Blue Warbler.

The Tennessee Warbler is rare in the Park, and it is doubtful if it breeds there. My only record is that of a single individual seen in shrubbery along the roadside near Frecks on August 7. The bird was close to me and low down, giving me a satisfactory view of all its marks. From descriptions of its home by other observers it is evidently an inhabitant of dense thickets along stream valleys, so I have included it here. The bird seen was probably an early fall migrant. In migration it occurs in the tops of trees as often as in low bushes.

The Tennessee Warbler's song is loud and high-pitched, but not musical. It may be written "pita pita pita pita-wit wit wit wit-zi zi zi zi zi zi zi zi zi." It is usually in three parts as this suggests, but is sometimes in only two parts. Each part is generally a little higher in pitch and a little louder than the preceding one.

CERULEAN WARBLER. *Dendroica cerulea* (Wils.)

The Cerulean Warbler, like most of its family, is smaller than the English Sparrow. The male has the upper parts light cerulean blue, striped with black, with white wing bars and tail patches. The under parts are white with a band of black across the breast. The female is grayer above, without black stripes, and her breast is yellowish white without the black band. The white wing bars are prominent.

The Cerulean Warbler is one of the rare birds of the Park, only a single bird having been seen. While it occurs regularly in western New York it is extremely local and confined mostly to lowland regions, where it lives in the tops of tall hardwood trees. On July 21, I found this bird in the top of a tall maple on Quaker Run. I discovered it through hearing the song, which sounded vaguely familiar, although I was unable to determine the species by this alone, as it was thirteen years since I had last heard it. The song

as I wrote it down was "cree-cree-cree-cree-cree-e-e-tup." The first four notes are of even pitch, the fifth a tone higher, and the last note drops sharply. Whether this is a typical song for the species I cannot yet say. The voice was quite loud, but not particularly musical. The ending suggested the Parula Warbler, but the voice was somewhat like that of the Black-throated Blue, while the rhythm—the fifth "cree" being twice the length of each of the other four—was as perfect as that which characterizes the Nashville Warbler. I watched the tree for about half an hour, before the little bird finally came out of the dense foliage where I could get a brief, but thoroughly satisfactory view of its beautiful colors.

Whether the bird nests in the Park may well be questioned. Perhaps my single specimen was but a wanderer from a distance. Many times in July I passed the point where it was found, but did not find it or hear it again.

IDENTIFYING BIRDS IN THE FIELD

The student of birds, who is just beginning the fascinating study, often wishes for the companionship in the field of one who is already well initiated. He hopes that such companionship will help him to find and know the birds more easily. Yet when the opportunity comes he is often disappointed. The expert identifies birds about him so quickly and unerringly by a mere glance, a flash of a wing, a bit of song, that the beginner feels lost and gains less from his opportunity than he expected.

There is no short or easy method of obtaining a knowledge of birds. It must all come by slow, careful, painstaking work, whenever the opportunity arrives. Above all, one should observe quietly, avoiding quick motions and keeping all the senses alert (figure 94). Once the student gets a fairly intimate acquaintance with our commoner birds in the field, he too learns to distinguish them at a glance; and many little points of flight or habit or voice that are impossible to describe in a book are stored up in memory. Just as one knows his friends at a long distance by the way they walk, so he knows each kind of bird by its pose and manner of flight. Just as he knows the voices of his friends over the telephone, so he recognizes the bird songs of woods and fields. That he senses the sights and sounds of the forest and the ways of wild life with increasing accuracy, he does not himself doubt. But it is difficult for him to explain just how he does it. Only long, patient observation and practice sharpen one's perception and disclose the deeper secrets of the woods.

Most of the popular bird guides emphasize the color of birds, as a means of identification. Color is perhaps the first, and most important factor, at least for the beginner, but it is by no means the only one. The observer soon finds that size, shape, habit, flight, voice and association all have their importance and each one may be of great value in naming a bird in the field.

Identification by Color. The successful student of birds must have a reasonably good knowledge of color and color names. If his sense of color is not good he is handicapped at the very beginning. The identification of some of the more difficult species, when color alone is considered, often hangs upon a slight distinction difficult to perceive in the field. Thrushes, flycatchers and sparrows are often to be distinguished by slight differences in shades of olive, brown, gray, buff or cream. These colors, however distinct when on paper close to the eye, are most difficult to distinguish when on the feathers of a live bird flitting through the dim light of a forest and concealing itself in the foliage.

To see color clearly the light must be in the right direction, coming from back of the observer and not from behind the bird. A bird seen against the skyline will appear all black, when in reality it may be brightly colored. Iridescent plumage, as that of the swallows, the Hummingbird, and the blackbirds is liable to appear any color but the right one. The observer must then maneuver to get his bird in the proper light, and if possible against a dark background, such as the foliage or trunk of a tree or the ground itself. If, while attempting to do this, the bird disappears into places where it cannot be found or followed, the observer must patiently put off its identification to a more opportune time, storing up in memory or his notebook the observations already made, for future reference.

Identification by Size. Most beginners underestimate the size of a bird in the field. For this reason size expressed in length by inches is deceiving. Ask anyone who has never looked it up in a book how long a Robin is, and he will be likely to say six or seven inches. In reality the length is nearly ten inches. For this reason, expressions such as "a little smaller than the Robin" or "a little larger than the English Sparrow" mean more to the beginner than length expressed in inches. I have used such expressions here in describing the Allegany Park birds, comparing their sizes with three well-known birds, the English Sparrow, Robin and Crow, whose lengths are approximately six, ten and eighteen inches.

The length of a bird is not always a true measure of its size or weight. For example, the Brown Thrasher is considerably longer than the Meadowlark; but the Meadowlark is really a larger and heavier bird, with a short tail, whereas the Thrasher appears more slender, with a long tail. Long-winged birds in flight often appear larger than they really are. The Osprey has often been mistaken for an Eagle, not so much because of the white on its head, as because of the long wings that make it appear unusually large.

Estimate of size is frequently difficult to make in the field, and identification of a bird by size alone is never safe. One cannot distinguish with certainty in the field between Herring and Ring-billed Gulls, or Common and Fish Crows by size alone. Even a trained observer often has the experience of seeing a bird that appears much larger or smaller than the species to which he knows it belongs. It is really not so much larger or smaller, for the size

of the individual of a species varies only slightly. When one has just been looking at a small bird, a large bird appears larger than normal and vice versa. The distance of the bird from the observer is often underestimated, also. Size is nevertheless an important factor, and the beginner should always note his impression of the size of a bird he wishes to identify, comparing it if possible to birds that may be near it and with which he is well acquainted.

Identification by Shape. Birds as a group show little variation in the shape of their bodies. Since they are built for flight, shape must necessarily be about the same in all species. The principal shape characters are to be found in length or contour of wing or tail, shape of the bill, length of neck or legs and presence or absence of a crest on the head. In some species these are an almost absolute means of identification, determining the resting pose or manner of flight, distinguishable at considerable distances. A Kingfisher might be identified by the shape of its head alone without a single color character. The deep fork of the Barn Swallow's tail separates it at once from any other Swallow. The tail of the Grackle, the bill of the Grosbeak, the legs and neck of the heron are all examples of shape characters that are extremely useful as means of identification. The shape of the bill at once indicates whether a small bird is to be looked for among sparrows and finches, or warblers, vireos or thrushes.

Identification by Habit. Habits of birds, once learned, are extremely useful in identification. Such habits may be flight, methods of feeding, whether flocking or solitary, manner of perching, walking or hopping. The bird sitting alone in the top of a dead tree might be a Kingbird, a Bluebird or a Shrike. It could hardly be a warbler or a vireo. But the bird that flits incessantly about among the foliage, giving the observer scarcely a glimpse of its plumage, is very likely warbler or vireo. Those birds feeding in a flock in the meadow might be Meadowlarks, Cowbirds, Starlings or Grackles, but they would certainly not be wrens or warblers or chickadees. The flights of swifts and swallows are instantly distinct to one who knows these birds although the difference may be difficult to describe. The habit of slowly lifting and lowering the tail on the part of the Hermit Thrush will separate it from other Thrushes almost as certainly as the color. When a little bird climbing on a tree trunk turns and runs head downward, we know it cannot be a woodpecker, but is either a nuthatch or Black and White Warbler.

Indentification by Associations. Birds, with their power of flight, are more difficult to relegate to any one kind of habitat or locality than are most forms of wild life. It is always possible for a bird to be out of its natural environment. Yet birds have decided preferences as to their associations, and these preferences are great helps in identification. We do not expect to find the Bluebird, Grackle, or Kingbird in a dense forest; nor the Oven-bird, vireo or warbler in an open meadow. The Field Sparrow, Towhee and

Yellow-throat suggest low thick bushes; the Kingfishers, Sandpipers, Green Heron or Red-winged Blackbird, presence of marsh, pond or stream. The student who relates birds to their environment will find that the knowledge he gains by so doing will be his greatest help in intuitive field identification.

Identification of Voice. All the other means just discussed by which we can identify birds have depended on seeing the bird. But the ear can be trained to distinguish birds quite as well as the eye. Songs are difficult to describe with exactness, yet there is in the song of each species something characteristic, something specific, that distinguishes it at once from all other species. We can see a bird well enough to determine its colors accurately only at a comparatively short distance, only on the side from which the light comes, and only when no leaves, branches or other obstructions are between us and the bird. But we can hear it as far as its voice carries, and from any direction.

Song cannot be used as an absolute identification in all cases, for it is too variable a factor. While a large percentage of birds of a given species may sing in a perfectly characteristic manner, occasionally one may have a freak song, sufficiently lacking in the characteristics of its species to make its identity doubtful until it is actually seen. Even the best observer, one who can identify instantly each species of thrush, vireo or warbler by its voice alone, hears now and then a song that puzzles him. The bird in such cases must be identified by sight.

In regions where the Starling is abundant, one must be careful in making identifications by song, for the Starling has become a clever mimic of many American birds. The Catbird and Thrasher likewise often imitate other birds, but their imitations are usually interpolated in the midst of their own characteristic songs, so they need not deceive one. But the Starling imitates Wood Pewees, Cowbirds, Chickadees, Grackles and other species so perfectly that the observer must be always on the alert.

A question that will come to the observer is this, "Shall I keep records of the birds I have heard only, as well as those I have seen?" The answer to this depends upon circumstances. The carol of the Robin, the long call of the Flicker, the peculiar trill of the Field Sparrow and even many of the more difficult warbler songs, are unmistakable when sung in the normal, characteristic manner of the species. If the song heard is perfectly characteristic, if the observer is sure he knows that song beyond question, and if there is nothing unusual in season or locality about the record, then it is just as good as actually seeing the bird. But if there is the least question on any of these points, one should otherwise verify his observation, or failing in this, should record it as doubtful.

On the third of July, my first day in this region, as I walked along the river below Salamanca, I heard a bird sing once. Instantly I thought to myself: "Orchard Oriole." Then I listened again, but the bird had evidently sung all that it was going to. Where to go and look for it I could not be sure. This bird is of

rare occurrence in the Allegany Park country, and although my identification may have been entirely right, I have left the bird out of my list.

On the same day I heard my first Red-eyed Vireo in that region. There were several birds, and they sang persistently. The song was entirely characteristic of the species, and I knew it well. Therefore I did not hesitate to include this bird in my list immediately, although it was more than a week before I actually saw one.

He who would use song as a means of identifying birds must possess an ear for music. If his sense of music is lacking then he will have difficulty in remembering bird songs. Five factors are present in bird songs, and the variations in these factors are the points that distinguish different songs from one another. These factors are pitch, time, quality, intensity and pronunciation. Pitch may vary from the extremely high-pitched songs of some warblers to the low-pitched "coo" of the Mourning Dove. Songs may have little or no pitch variation, as in the Junco, or extreme variation as in the Bobolink and Brown Thrasher. In time, songs vary from short performances scarcely more than a second in length to long-continued songs that may last fifteen minutes. The time may be regularly or irregularly rhythmic or entirely lacking in rhythm. In quality, songs may vary from sweet, clear and highly musical ones to harsh phrases that jar and grate upon the ear. The intensity or loudness of song varies greatly. Sometimes there is a distinct variation in the loudness of certain single notes. Some birds have marked consonant sounds in their songs. Liquid sounds like the letter l, are common in the best singers, while explosive consonant sounds like the letters t, d, p, are characteristic of others. The beginner will find that writing the syllables as they sound to him will be more helpful than trying to fit English words or phrases to a song. The latter may be useful to some extent in indicating the rhythm, but they seldom fit the bird's pronunciation perfectly.

FIELD KEY TO THE BIRDS OF ALLEGANY PARK

How to use the Field Key. The following key for the identification of birds, is designed for the use of the field student. Descriptions are purposely not complete in many details, but are confined to those points easily observed in the open. The key includes plumages of females and young where they differ from those of adult males.

In many cases the same species has been included under several different color headings, because of the fact that under different conditions different colors and marks are more conspicuous. The student must have a good sense of color and a reasonable knowledge of color names. Experience has shown me that many persons are not so equipped. Grays, browns and dull greens are easily confused. Birds of such inconspicuous colors must be carefully observed in good light in order to identify them properly.

The beginner will find that at first he fails to identify many birds because he has not made out such details as wing bars, lines over or through the eye, or spots on throat or breast. To identify birds successfully such detail must be observed, particularly in the brown, green, gray and yellow groups. In dealing with size it must be remembered that mistakes are easily made in the field. The bird that seemed larger than a Robin, if not found under that heading, should be looked for in a larger or smaller group. The first division of the key, between the smaller and the larger birds, has been difficult to apply absolutely. Field estimates of size are at best only rough, and some birds are more likely to be confused with other closely related kinds, or those similar in habit, than with others more nearly of their own size. A few birds not much larger than the Robin are likely to be confused with the birds of the larger group. Thus in constructing the key it has been considered best, in a few exceptional cases, to bring the related or easily confused species together for comparison without strict regard to size. Thus the Screech Owl, Woodcock, Sharp-shinned and Sparrow Hawks will be found classed with the larger birds—larger than the Robin, and the Pileated Woodpecker with the smaller birds—those little larger than the Robin and smaller.

The key has been arranged somewhat differently from those in general use. One should begin with the first number on the left and determine whether the bird belongs in the group of smaller, 1, or larger, 2, birds. The numbers on the right, 3 or 265, tell where to turn next. The great majority of birds seen will belong in the smaller group, 3. Beginning with 3 we find these birds are divided into eight groups according to the *predominant color*, and are numbered from 3 to 10. The numbers in parenthesis on the left indicate the number from which we have come, so that the key may be readily followed backward. Having determined to which color group our bird belongs, we next turn to the number indicated on the right margin of the page and continue from there. If the characteristics following the number do not fit your description of the bird in question, continue with the next consecutive number until one is found that does. The reference following the name of the bird gives the page on which a fuller description, together with notes on habits and voice, will be found.

Let us assume a case to illustrate the method of using the key. We have seen a bird in the field and have a fairly good provisional description of it (cf. p. 298). It was singing in the branches of a tree, a rather musical, long-continued song, made up of short, quick phrases of three or four notes each, with pauses between the phrases. It was olive-green on the upper parts, white beneath, with the top of the head gray, a dark line through the eye, and a lighter line over it. It was no larger than an English Sparrow, and perhaps a little smaller.

It obviously belongs among the smaller birds, and among those *green or greenish* in color. This leads to number 116. Here we read, "Larger than the English Sparrow." This does not agree,

so we turn to 117 which reads, "Size of the English Sparrow or smaller," and this leads to 122. Under 122 we read, "Exceedingly small. Bill long and needle-like." This does not apply so we try 123, "Not exceedingly small. Bill not needle-like," which leads to 124. This reads, "Wing conspicuously long and pointed," which does not fit the case, so we pass to "Wing not conspicuously long and pointed," under 125. This leads to 126 and reads, "With conspicuous wing bars." We did not make out this point, or our notes say nothing about it. So we will assume it had wing bars and try 126 and then if that does not agree we will try 127. From 126 we turn to 128, "Throat black," which is not the case. Then 129, "Throat white," leads to 130. There are two sub-heads, 130 and 131, and the former, 130, reads "Head bluish gray," etc., which agrees with our bird better than 131. But the description in the key does not agree fully, for we did not see a line encircling the eye, nor the yellowish sides, and the key says nothing about a dark line through the eye.

We have come to the end of the birds under 126, "With conspicuous wing bars," so probably our assumption that the bird had wing bars was wrong. So we return to 126 and start with 127, "Without conspicuous wing bars," which leads to 132. Here we read, "Top of the head gray in contrast to the olive-green back. A white line over the eye and a darker line through it." This fits our bird perfectly, so we pass to 134. Under 134 and 135 we find two birds, the Red-eyed Vireo and the Tennessee Warbler, both of which descriptions might fit our bird. We do not feel sure about the slight differences in size, slenderness of bill or brightness of coloring. Let us see what the text has to say about these birds, as indicated by the references to pp. 298, 329.

In the text we find that the Red-eyed Vireo is exceedingly common in the Park, while the Tennessee Warbler is rare. The description of the song of the Red-eyed Vireo agrees with the one we have heard, while that of the Tennessee Warbler does not. We conclude, therefore, that our bird is probably a Red-eyed Vireo, and our acquaintance with one of the common and characteristic birds of the Park has begun.

In the above case we assumed that the bird in question was seen quite clearly, as to most details, and the colors clearly made out. When such is not the case it will not always be possible to use the key, and the bird is better left unidentified for the present. If a bird has been clearly seen, and yet cannot be traced in the key, the student should consult some good general handbook of birds, for other species than those listed probably occur in the Park.

Key for the Identification of Birds in the Field

- | | | |
|----|---|-----|
| 1 | Smaller birds, from a little larger than the Robin, downwards. | 3 |
| 2 | Larger birds, larger than the Robin. | 265 |
| 3 | (1). Birds mainly brown or brownish in color. | 11 |
| 4 | (1). Birds mainly gray or grayish in color. | 89 |
| 5 | (1). Birds mainly green or greenish in color. | 116 |
| 6 | (1). Birds mainly black in color. | 138 |
| 7 | (1). Birds mainly black and white in color. | 143 |
| 8 | (1). Birds mainly blue or bluish in color. | 174 |
| 9 | (1). Birds mainly yellow, or orange, or marked with yellow or orange. | 191 |
| 10 | (1). Birds mainly red, or marked with red, or brownish red. | 238 |
| 11 | (3). Larger than the Robin. | 14 |
| 12 | (3). Smaller than the Robin, but larger than the English Sparrow. | 24 |
| 13 | (3). Size of the English Sparrow or smaller. | 48 |
| 14 | (11). Wings conspicuously long and pointed. | 16 |
| 15 | (11). Wings not conspicuously long and pointed. | 18 |
| 16 | (14). Back mottled. Tail and throat marked with white or buff. Usually seen on the ground or in low limbs of trees in the woods. Head large, but bill small. Whip-poor-will , p. 289 | |
| 17 | (14). Back plain brown. Lower back reddish brown. A white ring around the neck. Lower parts pure white, crossed on the throat and breast by two black bands. Killdeer , p. 314 | |
| 18 | (15). Upper parts uniform plain brown. Tail long and marked with white. Under parts pure white, unmarked. | 22 |
| 19 | (15). Upper parts bright reddish brown. Tail long. Under parts white, heavily streaked with brown. Brown Thrasher , p. 280 | |
| 20 | (15). Upper parts brown, barred with black. Lower back white, conspicuous in flight. Under parts buff, spotted with black. A black crescent-shaped mark on the front of the breast, and a similar shaped mark of red on the back of the head. Male with a streak of black on the cheek. Flicker , p. 262 | |
| 21 | (15). Upper parts brown, streaked. Tail with white outer feathers, conspicuous in flight. Under parts rich yellow, with a black v-shaped mark across the breast. Meadowlark , p. 273 | |
| 22 | (18). Bill partly yellow. Wings showing reddish brown in flight. Under side of the tail with large white spots. Eyelids not red. Yellow-billed Cuckoo , p. 324 | |
| 23 | (18). Bill black. Wings without reddish. Under side of the tail with narrow white marks. Eyelids red. Black-Billed Cuckoo , p. 325 | |
| 24 | (12). Head conspicuously crested. | 26 |
| 25 | (12). Head not conspicuously crested. | 28 |
| 26 | (24). Crest, wings and tail, tinged with red. Tail blackish. Rest of plumage, plain brown. Cardinal , female, p. 281 | |
| 27 | (24). Crest not red. Tail tipped with yellow. Black about the eyes. Plumage soft brown, shading to gray on wings and tail and low beneath. With or without red marks in the wings. Cedar Waxwing , p. 261 | |
| 28 | (25). Entire plumage plain grayish brown. | 30 |
| 29 | (25). Plumage not plain brown, either streaked or lighter below than above. | 32 |
| 30 | (28). Bill short, tail medium in length. Cowbird , female, p. 274 | |
| 31 | (28). Bill long, tail short. Starling , young, p. 268 | |
| 32 | (29). Legs and neck rather long, bill short. Usually seen in marshes among cat-tails or tall grass. Upper parts olive-brown streaked with white. Lower parts gray with black on the throat. Sora , p. 312 | |
| 33 | (29). Legs and neck not long. | 34 |
| 34 | (33). Plumage streaked above. | 36 |
| 35 | (33). Plumage plain uniform brown above. | 41 |
| 36 | (34). Breast conspicuously streaked. | 39 |
| 37 | (34). Breast not streaked, but sides lightly streaked. Usually in open meadows. Bobolink , female, p. 274 | |

- 38 (34). Breast faintly streaked or with a black patch. Black marks about the head. Back pale brown, streaked. Tail brown on the central feathers, with outer feathers black, edged with white. **Prairie Horned Lark**, p. 276
- 39 (36). Bill broad and heavy. Usually seen in woods and thickets or amid foliage. **Rose-breasted Grosbeak**, female, p. 325
- 40 (36). Bill not especially broad and heavy. Usually seen in open country or about marshes. **Red-winged Blackbird**, female, p. 311
- 41 (35). Marked with conspicuous white on the wings and tail, sides reddish. **Towhee**, female, p. 278
- 42 (35). Marked with white wing bars. Reddish color in the wings and tail, conspicuous in flight. Throat gray, under parts pale yellow. **Crested Flycatcher**, p. 264
- 43 (35). No wing-bars or other white marks. Upper parts plain brown or somewhat reddish brown. Breast spotted. 44
- 44 (43). Upper parts uniform tawny brown. Breast faintly spotted, often appearing unspotted in a faint light. **Veery**, p. 322
- 45 (43). Upper parts olive-brown, distinctly reddish on the head. Breast heavily spotted. **Wood Thrush**, p. 292
- 46 (43). Upper parts olive-brown, distinctly reddish on the tail. Breast medium heavily spotted. **Hermit Thrush**, p. 291
- 47 (43). Upper parts plain olive-brown without reddish anywhere. Breast medium heavily spotted. Cheeks and sometimes the throat distinctly buffy. **Olive-backed Thrush**, p. 293
- 48 (13). Wings conspicuously long and pointed. Usually seen in flight or on conspicuous perches. 50
- 49 (13). Wings not conspicuously long and pointed. Usually seen either on the ground or in trees or bushes. 56
- 50 (48). Lower back with a conspicuous patch of buff or pale brown. **Cliff Swallow**, young, p. 266
- 51 (48). Lower back the same color as the rest of the upper parts. 52
- 52 (51). Tail rounded, under parts nearly as dark as upper. **Chimney Swift**, p. 267
- 53 (51). Tail forked. Under parts distinctly lighter than upper. 54
- 54 (53). Throat white, breast crossed by a brown band. **Bank Swallow**, p. 315
- 55 (53). Throat gray, breast without brown band. **Rough-winged Swallow**, p. 314
- 56 (49). Very small. Upper parts barred with darker. 58
- 57 (49). Not very small or barred above. 60
- 58 (56). Upper parts rich brown. Under parts only slightly lighter. Tail very short. In deep forests. **Winter Wren**, p. 289
- 59 (56). Upper parts grayish brown. Under parts distinctly lighter. Tail medium short. In orchards and about buildings. **House Wren**, p. 265
- 60 (57). Upper parts uniform brown, not streaked. 62
- 61 (57). Upper parts streaked. 68
- 62 (60). Breast not conspicuously spotted. Grayish brown above, somewhat lighter below. **Indigo Bunting**, female, p. 278
- 63 (60). Breast conspicuously spotted. 64
- 64 (63). Top of the head dull orange, bordered by black lines. Upper parts plain olive-brown. **Oven-bird**, p. 285
- 65 (63). Top of the head the same color as the back. A conspicuous light line over the eye. 66
- 66 (65). Line over the eye and under parts yellowish. Throat and breast heavily spotted. **Northern Water-Thrush**, p. 327
- 67 (65). Line over the eye and under parts nearly white. Breast, but not the throat, spotted. **Louisiana Water-Thrush**, p. 328
- 68 (61). Breast streaked. 70
- 69 (61). Breast not streaked*. 81

*A small brown bird with upper parts streaked and under parts plain white, and a habit of creeping spirally up the rough bark of a tree trunk, is the Brown Creeper, p. 297.

- 70 (68). Outer tail feathers edged with white conspicuous in flight. Shoulders bay color. Usually in open fields or along roadsides. **Vesper Sparrow**, p. 270
- 71 (68). Outer tail feathers not edged with white. 72
- 72 (71). No wing-bars. Breast striped and with a conspicuous dark spot in the center, and a dark stripe on either side of the throat. **Song Sparrow**, p. 319
- 73 (71). With wing-bars. 74
- 74 (73). Smaller than the English Sparrow. 76
- 75 (73). As large as the English Sparrow. 80
- 76 (74). A narrow line through the center of the crown, and a stripe over the eye, which is bright yellow in front. **Savannah Sparrow**, p. 273
- 77 (74). No narrow line through the crown nor bright yellow over the eye. 78
- 78 (77). Crown streaked. **Chipping Sparrow**, young, p. 259
- 79 (77). Crown not streaked. **Field Sparrow**, young, p. 279
- 80 (75). A broad light line over the eye. Bill rather heavy. **Purple Finch**, female or young male, p. 305
- 81 (69). Throat marked with a black patch. Crown gray, sides of the head and shoulders rich brown. **English Sparrow**, male, p. 267
- 82 (69). Throat without black patch. 83
- 83 (82). Breast buffy. Size small, with short tail. **Grasshopper Sparrow**, p. 276
- 84 (82). Breast not buffy, but plain gray. 85
- 85 (84). Larger, upper parts dull grayish brown without reddish anywhere. **English Sparrow**, female, p. 267
- 86 (84). Smaller, upper parts with some distinct reddish brown. 87
- 87 (86). Crown bright reddish brown, bordered by white lines, in contrast to the duller back. Bill and feet black. **Chipping Sparrow**, p. 259
- 88 (86). Crown and back pale reddish brown without contrast. No white crown border. Bill and feet pinkish. **Field Sparrow**, p. 279
- 89 (4). Size of the Robin or larger. 92
- 90 (4). Smaller than the Robin but larger than the English Sparrow. 94
- 91 (4). Size of the English Sparrow or smaller. 103
- 92 (89). Wings long and pointed, marked with conspicuous white patches. Seen mainly in flight toward evening. **Nighthawk**, p. 275
- 93 (89). Wings not conspicuously long and pointed, upper parts gray, specked with whitish, under parts spotted. **Robin**, young, p. 256
- 94 (90). Body plain gray above and below. Top of the head and tail black. Under tail coverts reddish brown. **Catbird**, p. 321
- 95 (90). Body plain gray above, lighter below. 96
- 96 (95). Under parts pure white, unmarked. A white band across the end of the tail. Head and tail black or blackish. **Kingbird**, p. 256
- 97 (95). Under parts grayish or yellowish white, unmarked. 99
- 98 (95). Under parts spotted. 101
- 99 (97). Legs, neck and bill long. Wing showing a white stripe extending lengthwise when in flight. Usually seen near water on shores of streams or ponds. **Spotted Sandpiper**, young, p. 313
- 100 (97). Legs, neck and bill normal. Upper parts dull gray, darker on the head. **Phoebe**, p. 268
- 101 (98). Legs, neck and bill long. Wing showing a white stripe when in flight. Usually seen near water on shores of streams or ponds. **Spotted Sandpiper**, adult, p. 313
- 102 (98). Legs, neck and bill normal. Upper parts gray with a tint of blue in the wings and tail. **Bluebird**, young, p. 260
- 103 (91). Wings long and pointed. Tail somewhat forked. Seen in flight or on conspicuous perches. Upper parts grayish, under parts pure white. **Tree Swallow**, young, p. 327
- 104 (91). Wings not long and pointed. 105
- 105 (104). Throat and breast dark gray in contrast to white under parts. Outer tail feathers white, conspicuous in flight. Upper parts uniform gray. **Junco**, p. 285
- 106 (104). Throat and breast not gray or else no contrast between these and the under parts. 107

- 107 (106). Throat marked with a black patch. Top of the head black. Back gray. Cheeks white. **Chickadee**, p. 291
- 108 (106). Throat white or whitish. 109
- 109 (108). Upper parts dull gray, not bluish. Wing-bars. Birds usually seen sitting on conspicuous perches or flying out for winged insects. 114
- 110 (108). Upper parts dull bluish gray. Under parts yellowish white. Conspicuous white wing-bars. **Cerulean Warbler**, female, p. 329
- 111 (108). Upper parts light bluish gray. Under parts and cheeks white. Top of the head black or dark gray. Usually seen climbing on large limbs, often head downward. **White-breasted Nuthatch**, p. 295
- 112 (108). Head only bluish gray. Back olive-green. Under parts white with yellowish sides. A white mark extending from the bill to the eye and encircling the latter. Wing-bars. **Blue-headed Vireo**, p. 305
- 113 (108). Upper parts dull olive-gray. Under parts yellowish white. A light-colored line over the eye. No wing-bars. **Warbling Vireo**, p. 263
- 114 (109). Larger, wing proportionately longer. Note a long-drawn-out, plaintive "pec-a-wee." **Wood Pewee**, p. 304
- 115 (109). Smaller, wing proportionately shorter. Note a short, quick "chebec" often rapidly repeated. **Least Flycatcher**, p. 263
- 116 (5). Larger than the English Sparrow. 118
- 117 (5). Size of the English Sparrow, or smaller. 122
- 118 (116). Upper parts plain dull green. Under parts yellowish, unmarked. 120
- 119 (116). Upper parts faintly barred. Under parts yellowish white and streaked. **Scarlet Tanager**, young, p. 299
- 120 (118). Wings and tail black. **Scarlet Tanager**, male in late summer, p. 299
- 121 (118). Wings and tail greenish. **Scarlet Tanager**, female, p. 299
- 122 (117). Exceedingly small. Bill long and needle-like. Flight, quick and darting, the bird sometimes poising in air with wings moving so rapidly as to be invisible, but producing a humming noise. Throat red in male and white in female. **Ruby-throated Hummingbird**, p. 323
- 123 (117). Not exceedingly small. Bill not needle-like. Flight normal. 124
- 124 (123). Wing conspicuously long and pointed. Usually seen in flight or on conspicuous perches. Upper parts green or bluish green. Under parts pure white. **Tree Swallow**, p. 327
- 125 (123). Wing not conspicuously long and pointed. 126
- 126 (125). With conspicuous wing-bars. 128
- 127 (125). Without conspicuous wing-bars. 132
- 128 (126). Throat black. Sides of the head marked with yellow. Under parts white. Back green. **Black-throated Green Warbler**, p. 299
- 129 (126). Throat white. 130
- 130 (129). Head bluish gray, with a white mark extending from the bill to the eye, and encircling the eye. Sides yellowish. Back and wings olive-green. **Blue-headed Vireo**, p. 305
- 131 (129). Top of the head and back yellowish green. Cheeks white. **Chestnut-sided Warbler**, young, p. 279
- 132 (127). Top of the head gray in contrast to the olive-green back. A white line over the eye and a darker line through it. 134
- 133 (127). Top of the head grayish green without contrast to the back. 136
- 134 (132). Size of the English Sparrow. Bill rather heavy and blunt. Crown dull gray and back dark olive-green. **Red-eyed Vireo**, p. 298
- 135 (132). Smaller than the English Sparrow. Bill slender. Crown light gray and back light olive-green. **Tennessee Warbler**, male, p. 329
- 136 (133). Upper parts grayish green. Under parts only slightly yellowish on the sides. **Warbling Vireo**, p. 263
- 137 (133). Upper parts olive-green, under parts entirely yellowish. **Tennessee Warbler**, female, p. 329
- 138 (6). Larger than the Robin. Tail long, with the longest feathers in the center. Plumage with purple, green and bronze reflections. **Bronzed Grackle**, p. 261

- 139 (6). Smaller than the Robin. 140
- 140 (139). Plumage entirely black, or speckled more or less with buff. Tail short, bill long and yellow. **Starling**, adult, p. 268
- 141 (139). Plumage black except head, which is brownish. Tail medium length. Bill short and black. **Cowbird**, male, p. 274
- 142 (139). Plumage black except shoulders which are brilliant red, edged with yellow. Tail medium length. **Red-winged Blackbird**, male, p. 311
- 143 (7). Woodpeckers, usually seen clinging to trunks of trees or large limbs in an upright position, never with the head down. 145
- 144 (7). Not woodpeckers. If seen climbing on trunks of trees, then often with the head downward. 163
- 145 (143). Much larger than the Robin. Head crested and marked with red. **Pileated Woodpecker**, p. 297
- 146 (143). No larger than the Robin. Head not crested. 148
- 147 (143). Smaller than the Robin. 154
- 148 (146). Head entirely red. Body and wings marked in large patches of black and white. **Red-headed Woodpecker**, adult, p. 264
- 149 (146). Head with a single spot of red on the back. Back continuous white. Wings black, spotted with white. **Hairy Woodpecker**, male, p. 295
- 150 (146). Forehead dull orange-red. Back continuous white. Wings black spotted with white. **Hairy Woodpecker**, young male, p. 295
- 151 (146). Head without any red. 152
- 152 (151). Wings with large patches of white. Head brownish. Back grayish barred with black. **Red-headed Woodpecker**, young, p. 264
- 153 (151). Wings black with small spots of white. Back continuous white. **Hairy Woodpecker**, female, p. 295
- 154 (147). Red of the head on the forehead. 157
- 155 (147). Red of the head a single spot on the back of the head. Wings spotted black and white. Back continuous white. **Downy Woodpecker**, male, p. 262
- 156 (147). No red on the head. 161
- 157 (154). Forehead and throat red. Back barred. A large white patch in the wing visible when the wing is folded. **Sapsucker**, male, p. 296
- 158 (154). Forehead red, but throat white. 159
- 159 (158). Back barred, and a white patch on the wing. **Sapsucker**, female, p. 296
- 160 (158). Back continuous white. Forehead dull red or orange. Wing spotted, but not patched with white. **Downy Woodpecker**, young male, p. 262
- 161 (156). Back barred and white patch on the wing. **Sapsucker**, young, p. 296
- 162 (156). Back continuous white. Wing spotted black and white. **Downy Woodpecker**, female, p. 262
- 163 (144). Larger than the English Sparrow. 165
- 164 (144). Size of the English Sparrow or smaller. 170
- 165 (163). Under parts entirely black. Upper parts black with large patch of white and buff. **Bobolink**, male, p. 274
- 166 (163). Throat and upper breast black. Upper parts black and white. Under parts white, marked with red or pink. 168
- 167 (163). Entire under parts white. Upper parts apparently black, but actually dark gray, becoming blacker on the head and tail. Tail tipped with a broad band of white. **Kingbird**, p. 256
- 168 (166). Breast marked with a shield-shaped patch of rose or pink. **Rose-breasted Grosbeak**, male, p. 325
- 169 (166). Breast white, but sides brownish red. **Towhee**, male, p. 278
- 170 (164). Top of the head entirely black and not striped. Back gray. 172
- 171 (164). Top of the head striped black and white. Back and wings mixed black and white. Under parts white, with black stripes on the sides, and in the male on the throat. **Black and White Warbler**, p. 296
- 172 (170). Throat with a black patch. Cheeks white. **Chickadee**, p. 291
- 173 (170). Throat and cheeks white. Usually seen climbing on trunks of trees, often head downward, not bracing with the tail. **White-breasted Nuthatch**, p. 295

- 174 (8). Larger than the Robin. Head crested. 176
 175 (8). Smaller than the Robin. Head not crested. 178
 175 (174). Crest single and regular. Head normal size. Upper parts bright blue, with wings and tail marked with white and barred with black. Under parts white or grayish, with a black band across the breast. **Blue Jay**, p. 303
 177 (174). Crest double and irregular. Head and bill large. Upper parts grayish blue. A white collar about the neck and a blue band across the breast. Female with more or less rufous on the sides and breast. **Kingfisher**, p. 313
 178 (175). Larger than the English Sparrow. Upper parts brilliant blue in the male or grayish blue in female or young. Breast reddish in adults and spotted in young. **Bluebird**, p. 260
 179 (175). Smaller than the English Sparrow. 180
 180 (179). Wings long and pointed. Seen commonly in flight or on conspicuous perches in the open. 182
 181 (179). Wings not conspicuously long and pointed. Seen mainly in foliage of bushes or trees. 186
 182 (180). Tail deeply forked. Upper parts dark steel-blue with white marks in the tail. Under parts buffy or reddish. **Barn Swallow**, p. 266
 183 (180). Tail forked but not deeply. 184
 184 (183). Upper parts dark blue. Lower back with a patch of orange-buff. Forehead with a crescent-shaped white mark. **Cliff Swallow**, p. 266
 185 (183). Upper parts light greenish blue. Under parts pure white. **Tree Swallow**, p. 327
 186 (181). Body entirely blue, blackish on wings and tail, and darker on the head. No white in the wing. **Indigo Bunting**, male, p. 278
 187 (181). Body not entirely blue, and marked with white on the wing. 188
 188 (187). Throat black. A small white spot in the wing. Under parts white. **Black-throated Blue Warbler**, male, p. 290
 189 (187). Throat yellow, sometimes crossed by bands of rufous or blackish. Upper parts light blue. Wing-bars white. Center of the back dull yellow. **Parula Warbler**, p. 306
 190 (187). Throat white, and breast crossed by a black band. Upper parts light blue streaked with black. White wing-bars. **Cerulean Warbler**, male, p. 329
 191 (9). Larger than the Robin. 194
 192 (9). Smaller than the Robin, but larger than the English Sparrow. 196
 193 (9). Size of the English Sparrow or smaller. 206
 194 (191). Yellow on the breast, which is marked by a black v-shaped mark. Back brown and striped. Outer tail feathers white. **Meadowlark**, p. 273
 195 (191). Yellow in the linings of wings and tail, conspicuous in flight. Back brown with a white patch on the back. **Flicker**, p. 262
 196 (192). Throat black. Head and upper back black. Breast, lower back and shoulders bright orange. **Baltimore Oriole**, male, p. 260
 197 (192). Throat and head brownish black. Breast, lower back and shoulders dull orange. **Baltimore Oriole**, female, p. 260
 198 (192). Throat gray. Breast pale yellow. Upper parts brown with white wing-bars. Reddish in the wing and tail conspicuous in flight. **Crested Flycatcher**, p. 264
 199 (192). Throat yellow. 200
 200 (199). Throat and breast deep rich yellow. Upper parts olive-green. A white line over the eye. **Yellow-breasted Chat**, p. 281
 201 (199). Throat and breast pale or dull yellow. 202
 202 (201). Upper parts dull green. 204
 203 (201). Upper parts streaked with buff, brown and black. Breast buffy yellow with black streaks on the sides. **Bobolink**, in late summer, p. 274
 204 (202). Wings and tail green. **Scarlet Tanager**, female, p. 299
 205 (202). Wings and tail black. **Scarlet Tanager**, male in late summer, p. 299
 206 (193). Entire body mainly yellow. 208

- 207 (193). Entire body not yellow. 210
- 208 (206). Wings and tail yellow or dusky yellow. Breast, in the male streaked with brownish red. **Yellow Warbler**, p. 321
- 209 (206). Wings and tail and a patch on the forehead black. Wings barred with white. **Goldfinch**, male, p. 259
- 210 (207). Yellow mainly on the breast, throat or under parts. 213
- 211 (207). Yellow mainly on the head. 234
- 212 (207). Yellow or orange on wings and tail and sides of breast. 236
- 213 (210). Throat yellow, unmarked. 217
- 214 (210). Throat black, extending in a patch over the top of the head. Under parts and a patch on the forehead, cheeks and about the eye, yellow. Upper parts olive-green. **Hooded Warbler**, male, p. 292
- 215 (210). Throat and breast yellow or orange, marked with black. 231
- 216 (210). Throat and head gray. Breast and under parts yellow. The line between the gray and yellow on the breast abrupt, and margined with black in the male. Upper parts olive-green. **Mourning Warbler**, p. 280
- 217 (213). Without wing-bars. 219
- 218 (213). With wing-bars. 225
- 219 (217). Forehead black, extending in a mask-like patch about the eyes. Upper parts olive-green **Maryland Yellow-throat**, male, p. 320
- 220 (217). Forehead and entire upper parts olive-green. 223
- 221 (217). Forehead yellow. Top of the head with more or less black. Upper parts olive-green, under parts yellow. **Hooded Warbler**, female, p. 292
- 222 (217). Forehead and back bluish gray. Under parts yellow. **Canada Warbler**, young, p. 322
- 223 (220). Throat and under tail coverts bright yellow **Maryland Yellow-throat**, female, p. 320
- 224 (220). Throat and entire under parts dull yellow. **Tennessee Warbler**, female, p. 329
- 225 (218). Upper parts light blue with white wing-bars. Center of the back dull yellow. **Parula Warbler**, female, p. 306
- 226 (218). Upper parts brownish olive, yellowish on the lower back. Wings blackish. **Goldfinch**, female, p. 259
- 227 (218). Upper parts olive-green. 228
- 228 (227). Lower back marked with yellow. Sides with black streaks. **Magnolia Warbler**, young, p. 300
- 229 (227). Lower back greenish, under parts dull yellow. . **Pine Warbler**, p. 310
- 230 (227). Lower back slaty gray. Throat bright yellow. Under parts white. **Yellow-throated Vireo**, p. 309
- 231 (215). Black consisting of streaks on the sides of the throat. Throat orange in the male, yellow in the female. Patches of orange or yellow in the crown and cheeks. Upper parts black or gray with yellow streaks on the back and a broad white patch in the wing. **Blackburnian Warbler**, p. 304
- 232 (215). Black consisting of a chain of spots across the lower throat suggesting a necklace. Upper parts blue-gray. **Canada Warbler**, p. 322
- 233 (215). Black consisting of a patch in the center of the breast, with black streaks radiating from this patch along the sides and under parts. Upper parts black and blue-gray. Lower back yellow. White patches over the eye and in the wing and tail. **Magnolia Warbler**, p. 300
- 234 (211). Cheeks and a line over the eye yellow. Throat black. Under parts white. Back greenish with white wing-bars. **Black-throated Green Warbler**, p. 299
- 235 (211). Cheeks white. Yellow on the top of the head. Throat white. Sides with a streak of bright chestnut-brown. **Chestnut-sided Warbler**, p. 279
- 236 (212). Upper parts and throat black. Under parts white. Patches in the wing, tail and sides of the breast bright orange. **Redstart**, male, p. 326

- 237 (212). Upper parts brownish. Under parts white. Patches in the wing, tail and sides of the breast yellow... **Redstart**, female, p. 326
- 238 (10). Body mainly red. **240**
- 239 (10). Body not mainly red, but marked with red or reddish brown. **242**
- 240 (238). Entire body bright red, including the wings and tail. Head crested. Face marked with black. **Cardinal**, male, p. 281
- 241 (238). Wings and tail black. Rest of body bright red. **Scarlet Tanager**, male, p. 299
- 242 (239). Red mainly on the breast or under parts. **247**
- 243 (239). Red mainly on the head. **255**
- 244 (239). Red entirely on the shoulders. Rest of the body black. **Red-winged Blackbird**, male, p. 311
- 245 (239). Red or orange mainly in the wings and tail and on the sides of the breast. Upper parts and upper breast and throat black. Under parts white. **Redstart**, male, p. 326
- 246 (239). Red on the throat. Size very small. Bill long and needle-like. Upper parts green. Under parts white. **Ruby-throated Hummingbird**, male, p. 323
- 247 (242). Entire breast, lower back and head pinkish red. Rest of the upper parts, including the wings and tail, brown. **Purple Finch**, male, p. 305
- 248 (242). Entire breast brownish red. **253**
- 249 (242). Breast with a shield-shaped patch of rose-red. Upper parts black and white. Throat black and the remainder of the under parts white. **Rose-breasted Grosbeak**, male, p. 325
- 250 (242). Breast, crested head and wings tinged with red. Rest of the plumage brownish, face blackish. **Cardinal**, female, p. 281
- 251 (242). Breast black above and white beneath. Sides brownish red. Upper parts black and white in the male and brown and white in the female. **Towhee**, p. 278
- 252 (242). Throat and breast white, but sides with a stripe of brownish red. Top of the head yellow. Back brownish olive, striped with black. Yellowish white wing-bars. **Chestnut-sided Warbler**, p. 279
- 253 (248). Larger, back gray with head and tail blackish. **Robin**, p. 256
- 254 (248). Smaller, back blue or bluish. **Bluebird**, p. 260
- 255 (243). Entire head red. Rest of the plumage black and white in large patches. **Red-headed Woodpecker**, adult, p. 264
- 256 (243). Forehead red. **259**
- 257 (243). Back of the head with a red spot. Rest of the plumage black and white. **263**
- 258 (243). Top of the head brownish red bordered by white lines. Back brown, streaked. Under parts grayish white. **Chipping Sparrow**, p. 259
- 259 (256). Forehead bright red. Back barred black and white. Throat red in the male and white in the female. **Sapsucker**, p. 296
- 260 (256). Forehead dull red or orange. Rest of the plumage black and white. **261**
- 261 (260). Size of the Robin. **Hairy Woodpecker**, young male, p. 295
- 262 (260). Size of the English Sparrow. **Downy Woodpecker**, young male, p. 262
- 263 (257). Size of the Robin. **Hairy Woodpecker**, adult male, p. 295
- 264 (257). Size of the English Sparrow. **Downy Woodpecker**, adult male, p. 262
- 265 (2). Neck and legs long. Neck drawn up but legs extended when in flight. **268**
- 266 (2). Neck rather long, but legs short. Neck usually extended in flight. **272**
- 267 (2). Neither neck nor legs conspicuously long. **277**
- 268 (265). Larger than the Crow. **269**
- 269 (265). A little smaller than the Crow. Back appearing blue or greenish blue, but really green. Neck reddish brown. **Green Heron**, p. 324
- 270 (268). Back and wings bluish gray. Size very large. **Great Blue Heron**, p. 314
- 271 (268). Back and wings brownish, streaked. Size smaller. **Bittern**, p. 311
- 272 (266). General color blackish, with white wing linings. Neck outstretched in flight. **Black Duck**, p. 316

- 273 (266). General color gray. Tail long, with the middle feathers longest. Tail tipped with white. Bill short. Flight sometimes accompanied by a whistling noise. **Mourning Dove**, p. 326
- 274 (266). General color brown, mottled with black. 275
- 275 (274). Larger than the Crow. Bill short. Flight straight, and usually accompanied by a loud whirring noise. **Ruffed Grouse**, p. 286
- 276 (274). Smaller than the Crow. Bill long. Flight erratic, usually accompanied by a whistling noise. **Woodcock**, p. 286
- 277 (267). Larger than the Crow. 279
- 278 (267). Crow size or smaller. 296
- 279 (277). Upper parts light gray. Under parts white. 282
- 280 (277). Upper parts partly light gray and partly brown. Tail partly black and partly white. Under parts mainly white. **Herring Gull**, immature, p. 315
- 281 (277). Upper parts brown or grayish brown. 284
- 282 (279). Head and tail gray. Lower back marked conspicuously with white. **Marsh Hawk**, adult male, p. 275
- 283 (279). Head and tail white. Wings tipped with black and marked with white spots. **Herring Gull**, adult, p. 315
- 284 (281). Head large. Eyes large and looking forward. Breast barred and streaked with brown. Flight noiseless. **Barred Owl**, p. 309
- 285 (281). Head not unusually large. Eyes not conspicuously looking forward. 286
- 286 (285). Tail and head white. Rest of body blackish brown. Very large. **Bald Eagle**, adult, p. 316
- 287 (285). Tail black or blackish. 290
- 288 (285). Tail reddish brown. Rest of the plumage brown above and usually white more or less spotted with brown below. **Red-tailed Hawk**, adult, p. 306
- 289 (285). Tail plain brown. 292
- 290 (287). Size very large. Entire plumage blackish brown, or with a little white in the breast. **Bald Eagle**, young, p. 316
- 291 (287). Size medium large. Body mainly dull grayish brown, indistinctly streaked. **Herring Gull**, young, p. 315
- 292 (289). Upper parts with a conspicuous white mark on the lower back. **Marsh Hawk**, female or young, p. 275
- 293 (289). Upper parts without white. 294
- 294 (293). Under parts heavily marked with reddish brown. Shoulders reddish brown. **Red-shouldered Hawk**, adult, p. 309
- 295 (293). Under parts white, streaked with brown. Either **Red-shouldered** or **Red-tailed Hawk**, young. These species are practically indistinguishable in the field in young plumage. p. 306
- 296 (278). Head large, with conspicuous ear tufts. Eyes looking forward. Plumage mottled, either gray or reddish brown. **Screech Owl**, p. 264
- 297 (278). Head not conspicuously large. No ear tufts; eyes not looking forward. 298
- 298 (297). Upper parts gray or brown. Under parts lighter, spotted or barred. 300
- 299 (297). Entire plumage black. **Crow**, p. 300
- 300 (298). Wings long and pointed. Back reddish brown. Wings with more or less blue-gray. Side of the head with black marks. **Sparrow Hawk**, p. 328
- 301 (298). Wings broad and rounded. Tail long. Back blue-gray in adult or brown, but not reddish in young. Under parts barred with reddish brown in adult or streaked with brown in young. **Sharp-shinned Hawk**, p. 350

LIST OF BIRDS OBSERVED IN ALLEGANY PARK

1. Herring Gull..... *Larus argentatus* Pont.
2. Black Duck..... *Anas rubripes* Brewst.
3. Bittern *Botaurus lentiginosus* (Montag.)
4. Great Blue Heron... *Ardea herodias herodias* Linn.
5. Green Heron..... *Butorides virescens virescens* (Linn.)
6. Sora *Porzana carolina* (Linn.)
7. Woodcock *Philohela minor* (Gmel.)
8. Spotted Sandpiper... *Actitis macularia* (Linn.)
9. Killdeer *Oxyechus vociferus* (Linn.)
10. Ruffed Grouse..... *Bonasa umbellus* (Linn.)
11. Mourning Dove..... *Zenaidura macroura carolinensis* (Linn.)
12. Marsh Hawk..... *Circus hudsonius* (Linn.)
13. Sharp-shinned Hawk. *Accipiter velox* (Wils.)
14. Red-tailed Hawk... *Buteo borealis borealis* (Gmel.)
15. Red-shouldered Hawk *Buteo lineatus lineatus* (Gmel.)
16. Bald Eagle..... *Haliaeetus leucocephalus* (Linn.)
17. Sparrow Hawk..... *Falco sparverius sparverius* Linn.
18. Barred Owl..... *Strix varia varia* Barton
19. Screech Owl..... *Otus asio asio* (Linn.)
20. Yellow-billed Cuckoo. *Coccyzus americanus americanus* (Linn.)
21. Black-billed Cuckoo. *Coccyzus erythrophthalmus* (Wils.)
22. Belted Kingfisher... *Ceryle alcyon alcyon* (Linn.)
23. Hairy Woodpecker.. *Dryobates villosus villosus* (Linn.)
24. Downy Woodpecker. *Dryobates pubescens medianus*
(Swains.)
25. Northern Pileated
Woodpecker *Phlæotomus pileatus abieticola* (Bangs)
26. Yellow-bellied Sap-
sucker *Sphyrapicus varius varius* (Linn.)
27. Red-headed Wood-
pecker *Melanerpes erythrocephalus* (Linn.)
28. Northern Flicker ... *Colaptes auratus luteus* Bangs
29. Whip-poor-will *Antrostomus vociferus vociferus* (Wils.)
30. Nighthawk *Chordeiles virginianus virginianus*
(Gmel.)
31. Chimney Swift..... *Chatura pelagica* (Linn.)
32. Ruby-throated Hum-
mingbird *Archilochus colubris* (Linn.)
33. Kingbird *Tyrannus tyrannus* (Linn.)
34. Crested Flycatcher.. *Myiarchus crinitus* (Linn.)
35. Phoebe *Sayornis phæbe* (Lath.)
36. Wood Pewee..... *Myiochanes virens* (Linn.)
37. Least Flycatcher *Empidonax minimus* (W. M. & S. F.
Baird)
38. Prairie Horned Lark. *Otocoris alpestris praticola* Hensh.
39. Blue Jay..... *Cyanocitta cristata cristata* (Linn.)
40. Crow *Corvus brachyrhynchos brachyrhyn-*
chos Brehm

41. Starling *Sturnus vulgaris* Linn.
42. Bobolink *Dolichonyx oryzivorus* (Linn.)
43. Cowbird *Molothrus ater ater* (Bodd.)
44. Red-winged Black-
bird *Agelaius phœniceus phœniceus* (Linn.)
45. Meadowlark *Sturnella magna magna* (Linn.)
46. Baltimore Oriole.... *Icterus galbula* (Linn.)
47. Bronzed Grackle.... *Quiscalus quiscula æneus* Ridgw.
48. Purple Finch..... *Carpodacus purpureus purpureus*
(Gmel.)
49. Goldfinch *Astragalinus tristis tristis* (Linn.)
50. English Sparrow ... *Passer domesticus* (Linn.)
51. Vesper Sparrow *Poœcetes gramineus gramineus* (Gmel.)
52. Savannah Sparrow.. *Passerculus sandwichensis savanna*
(Wils.)
53. Grasshopper Sparrow. *Ammodramus savannarum australis*
Mayn.
54. Chipping Sparrow... *Spizella passerina passerina* (Bech.)
55. Field Sparrow..... *Spizella pusilla pusilla* (Wils.)
56. Slate-colored Junco.. *Junco hyemalis hyemalis* (Linn.)
57. Song Sparrow..... *Melospiza melodia melodia* (Wils.)
58. Towhee *Pipilo erythrophthalmus erythroph-*
thalmus (Linn.)
59. Cardinal *Cardinalis cardinalis cardinalis* (Linn.)
60. Rose-breasted Gros-
beak *Zamelodia ludoviciana* (Linn.)
61. Indigo Bunting *Passerina cyanea* (Linn.)
62. Scarlet Tanager *Piranga erythromelas* Vieill.
63. Cliff Swallow..... *Petrochelidon lunifrons lunifrons* (Say)
64. Barn Swallow..... *Hirundo erythrogastra* Bodd.
65. Tree Swallow..... *Iridoprocne bicolor* (Vieill.)
66. Bank Swallow..... *Riparia riparia* (Linn.)
67. Rough-winged Swal-
low *Stelgidopteryx serripennis* (Aud.)
68. Cedar Waxwing..... *Bombycilla cedrorum* Vieill.
69. Red-eyed Vireo..... *Vireosylva olivacea* (Linn.)
70. Warbling Vireo..... *Vireosylva gilva gilva* (Vieill.)
71. Yellow-throated Vireo *Lanivireo flavifrons* (Vieill.)
72. Blue-headed Vireo... *Lanivireo solitarius solitarius* (Wils.)
73. Black and White
Warbler *Mniotilta varia* (Linn.)
74. Tennessee Warbler .. *Vermivora peregrina* (Wils.)
75. Northern Parula
Warbler *Compsothlypis americana pusilla*
(Wils.)
76. Yellow Warbler..... *Dendroica æstiva æstiva* (Gmel.)
77. Black-throated Blue
Warbler *Dendroica cærulescens cærulescens*
(Gmel.)
78. Magnolia Warbler .. *Dendroica magnolia* (Wils.)

79. Cerulean Warbler... *Dendroica cerulea* (Wils.)
 80. Chestnut-sided Warbler *Dendroica pensylvanica* (Linn.)
 81. Blackburnian Warbler *Dendroica fusca* (Müll.)
 82. Black-throated Green Warbler *Dendroica virens* (Gmel.)
 83. Pine Warbler..... *Dendroica vigorsi* (Aud.)
 84. Oven-bird *Seiurus aurocapillus* (Linn.)
 85. Northern Water-Thrush *Seiurus noveboracensis noveboracensis* (Gmel.)
 86. Louisiana Water-Thrush *Seiurus motacilla* (Vieill.)
 87. Mourning Warbler .. *Oporornis philadelphia* (Wils.)
 88. Maryland Yellow-throat *Geothlypis trichas trichas* (Linn.)
 89. Yellow-breasted Chat. *Icteria virens virens* (Linn.)
 90. Hooded Warbler..... *Wilsonia citrina* (Bodd.)
 91. Canada Warbler *Wilsonia canadensis* (Linn.)
 92. Redstart *Setophaga ruticilla* (Linn.)
 93. Catbird *Dumetella carolinensis* (Linn.)
 94. Brown Thrasher *Toxostoma rufum* (Linn.)
 95. House Wren *Troglodytes ædon ædon* Vieill.
 96. Winter Wren *Nannus hiemalis hiemalis* (Vieill.)
 97. Brown Creeper *Certhia familiaris americana* (Bonap.)
 98. White-breasted Nuthatch *Sitta carolinensis carolinensis* Lath.
 99. Chickadee *Penthestes atricapillus atricapillus* (Linn.)
 100. Wood Thrush *Hylocichla mustelina* (Gmel.)
 101. Veery *Hylocichla fuscescens fuscescens* (Steph.)
 102. Olive-backed Thrush. *Hylocichla ustulata swainsoni* (Tschudi)
 103. Hermit Thrush *Hylocichla guttata pallasii* (Cab.)
 104. Robin *Planesticus migratorius migratorius* (Linn.)
 105. Bluebird *Sialia sialis sialis* (Linn.)

LIST OF REFERENCES

ADAMS, CHARLES C.

1921. Suggestions for the Management of Forest Wild Life in the Allegany State Park, New York. Roosevelt Wild Life Bulletin, Vol. 1, No. 1, pp. 62-74.

CHAPMAN, FRANK M.

1914. Handbook of Birds of Eastern North America. Pp. 1-530. New York.

DWIGHT, JONATHAN, JR.

1892. Summer Birds of the Crest of the Pennsylvania Alleghanies. The Auk, Vol. 9, No. 2, pp. 129-142.

EATON, ELON HOWARD.

1910-1914. Birds of New York. N. Y. State Mus., Memoir
12, Vol. 1, pp. 1-501, 1910; Vol. 2, pp. 1-719, 1914.

FORBUSH, EDWARD HOWE.

1913. The Natural Enemies of Birds. Mass. State Board of
Agr., Bull. No. 3, pp. 1-58.

1913a. Useful Birds and Their Protection. Pp. 1-451. Boston.

1916. The Domestic Cat. Mass. State Board of Agr., Bull.
No. 2, pp. 1-112.

HERRICK, FRANCIS H.

1905. "The Cedar-bird." The Home Life of Wild Birds, pp.
86-102. New York.

HOFFMANN, RALPH.

1904. A Guide to the Birds of New England and Eastern
New York. Pp. 1-357. Boston.

JOB, HERBERT K.

1910. How to Study Birds. A Practical Guide for Amateur
Bird-lovers and Camera-hunters. Pp. 1-272. New
York.

MACCAUGHEY, VAUGHAN.

1917. The Natural History of Chautauqua. Pp. 1-133. New
York.

REED, CHESTER A.

1913. Bird Guide, East of the Rockies. Pp. 1-238. Worcester,
Mass.

SILLOWAY, P. M.

1920. Guide to the Summer Birds of the Bear Mountain and
Harriman Park Sections of the Palisades Interstate
Park. The New York State College of Forestry,
Syracuse, Bull. No. 11, pp. 1-105.

TODD, W. E. CLYDE.

1904. The Birds of Erie and Presque Isle, Erie County, Penn-
sylvania. Annals of the Carnegie Museum, Vol. 2,
pp. 481-596. (See for an ecological description of
the vegetation, Jennings, Otto E., "A Botanical Survey
of Presque Isle, Erie County, Pennsylvania." Annals
of the Carnegie Museum, Vol. 5, No. 3, pp. 289-421,
1909.)

ADDENDUM

SHARP-SHINNED HAWK. *Accipiter velox* (Wils.)

This small hawk may be distinguished from all birds but the Sparrow Hawk by its size. From the latter it may be known by its rounded rather than pointed wings, and in adults by its blue-gray back, and under parts cross-barred with reddish brown. Young birds are more brownish on the back and striped with dull brown beneath. The male is smaller than the female, being often only a little larger than the Robin. This bird may always be best identified by its shape in flight, the combination of rounded wings and long tail distinguishing it at once from hawks of both the *Buteo* and *Falco* groups.

The Sharp-shinned Hawk is not particularly common in the Park. In the summer of 1921 it was seen but once on Quaker Run, but in 1922 it seemed to have increased somewhat in numbers. This hawk is unquestionably a greater destroyer of small birds than any other of our common hawks. It often hunts by hiding in thick shrubbery and waiting until its prey approaches, and then pouncing upon it. Because of the fact that it kills many birds it has been hunted and destroyed unmercifully, particularly during its migrations; and in some regions it has become rare as a breeding bird. Yet it is a wild creature that cannot be blamed because nature gave it the instinct to kill birds for a living. It fills its place in nature, and too great a decrease in its numbers is liable to be followed by serious results.

It nests most commonly in the thick branches of a hemlock, sometimes constructing its own nest, and sometimes using an abandoned one originally built by crows. The eggs are curiously blotched and spotted. This hawk is usually silent when it hunts, but in late summer the calls of the hungry young will often betray the location of the nest.

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PLATE 29. A GROUSE FAMILY IN EARLY SUMMER.

The presence of the male, standing on guard, is only occasional at this time.
The scene is here idealized. Drawn by Edmund J. Sawyer.

THE RUFFED GROUSE, WITH SPECIAL REFERENCE TO ITS DRUMMING

By EDMUND J. SAWYER

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INTRODUCTION

No bird is more typical of our woods than the Ruffed Grouse or "Partridge." Many circumstances combine to make this one of the best known and most interesting of all our birds. Wary and wily, exceedingly swift of wing, fine flavored,—to the hunter he is the king of our game birds. Frequenting the woods along every mountain stream, he is the familiar favorite of the trout fisherman. When the last summer bird has gone this hardy forest denizen still remains in undiminished numbers. When the last leaf has fallen, and when still later the deep snow of the wood shows scarcely a sign of other birds, the fresh trails of the Grouse are still to be found winding among the trees. Here and there you may even find his bed of the night before, out of which he bursts through a foot of snow. As an object for study he has attracted most attention by his wonderful "drumming." Following the regular springtime season of drumming comes the charming family life with all its interest. First we look for the nest with its numerous creamy eggs at the foot of some tree, beside a log or under sheltering brush; then, the downy chicks with their marvelous ability at hiding amid the dead leaves; the devoted mother Grouse with her crafty tactics in leading us away from the precious brood; the dust-baths in sunny spots in the wood; and still, now and then, the alluring rumble of the mystic drum!

THE DRUMMING HABIT OF THE RUFFED GROUSE

Theories as to the Drumming Sound. The early ornithologists,—Audubon, Wilson, Nuttall,—as, indeed, their followers until a recent date, had only their several theories as to just how the drumming sound was produced. One thought the wings beat the bird's sides; another, the breast or, again, that the wings struck together above the back. It is about fifteen years since the publication by the present writer of the first, or one of the first, photographs to appear in print of a Ruffed Grouse in the act of drumming; also a life drawing and a description of the drumming, as seen in the woods (Sawyer, '08). Sepia copies of the drawing were distributed separately. From time to time for the past several years have appeared descriptive articles, illustrated with photographs, on the same subject. I think the most complete series of photographs I have seen in print are those by Vreeland, illustrating "The Drumming of the Ruffed Grouse" (Vreeland, '18). Yet much remains to be said of this phenomenon, owing to a still persisting haze of doubt about it, together with certain widely accepted points of misinformation. Professor Hodge, working with captive Grouse, said the sound was produced by virtue of certain so-called feather-cushions (Hodge, '05, p. 644). As for the latter theory it may be sufficient to note that close examination of a Ruffed Grouse fails to reveal any special development of the body plumage. If it was meant that a certain area of the plumage is merely *acted on* as a sound-producing cushion, yet that would still be mere theory and remain to be demonstrated.

Perhaps the most complete and interesting account we have had is that entitled "Some Notes on the Drumming of the Ruffed Grouse" (Tuttle, '19, '20). Mr. Tuttle relates his many observations at Huron Mountain, Michigan, from April 7 to 13, and at Simsbury, Connecticut, from April 15 to May 21. He illustrates his detailed description of the drumming with an excellent photograph of a drumming Grouse. Discussing the drumming, this observer calls attention to the inflated air sacs of related species and adds—"It does not seem to me at all impossible that the sound-carrying power of the drumming of *Bonasa* may in part be traced to an inflation of the rudimentary sacs which it possesses" ('19, p. 337). However, it is not obvious to the present writer that these rudimentary sacs, located as they are on the neck of the bird, could exert any considerable influence on the drumming sound. The wings, which all observers agree are the main consideration, have no contact with the neck in any part of the drumming. Mr. Tuttle believes the wings do not strike together behind the back of the bird. In this I quite agree with him. Commenting further on this point Mr. Tuttle writes, "Should it be proved that the wings do meet, it would still be difficult to prove that the sound was produced by their contact, rather than by the forward stroke against the air" ('19, p. 335). He is quite correct as regards the difficulty in determining how much of the sound would be attributable to the striking together



Fig. 95. A drumming log. The usual log is an old mossy trunk that lies flat on the ground.



Fig. 96. In drumming, the forceful, sound-producing blow is the *outward and upward* motion of the wings.



Fig. 97. The whirring of the "muffled drum." The picture is from an exposure of about 7 seconds, covering half of a drumming performance, beginning with the first wing-beat.



Fig. 98. A snapshot made between wing-beats early in the drumming. The wings hang limp for an instant before the next upward stroke.

of the wings in the case which he assumes. When, however, he refers to the "*forward* stroke against the air" (the italics are mine) as producing the sound, he falls into a common error. This point in the drumming I was lucky enough to clear up for the first time,—at least to my own satisfaction and as regards my own observations. Satisfied by previous observations that the drumming was mainly accounted for by the wings beating the air, I yet failed to understand how it was that the force of the wing-beats did not raise the bird from the log, since I had observed that he did not and could not grasp so broad a perch with any appreciable clinging power. Two of my blinds in 1921 were so favorably situated that this little mystery was very readily solved.

The Drumming Place. The rostrum and stage setting for so interesting a performance as this deserves at least brief mention. The drummings I have heard or witnessed have been in woods as varied as the usual general haunts of this grouse. Some have been in dry hillside growths of beech and maple, some in cedar thickets; many have been in mixed woods, often of a very swampy character. In other words, it appears that the Ruffed Grouse drums wherever he happens to live. The more exact spot selected may be deep in the wood or, again, may be near its edge; the sort of log preferred seems to be the greater and deciding consideration. I have known grouse to drum directly on the ground, on some bare spot screened by hemlock or other evergreens. Other observers have reported the birds drumming on rail fences and stone walls. Yet the usual drumming place is a log; and the usual log, an old mossy trunk that lies flat on the ground or even half-buried on the forest floor (figures 95, 120). Often it is falling to pieces from decay, with only here and there a spot sufficiently sound to afford the drummer a foothold; seldom is it a trunk recently felled, whether by wind or otherwise. Only in one instance have I seen a Ruffed Grouse use a drumming log which was sound on the outside and quite hollow within. The sound from this log, by the way, was the same dull characteristic "thumm"-ing. Yet, on one popular but mistaken theory (that the bird beats the log with his wings), this log should have proven a particularly resonant instrument.

How the Ruffed Grouse Drums. I have watched at the distance of a dozen feet the beginning, progress and ending of at least a hundred drummings. Each instance was a demonstration of at least one fact—that the forceful, sound-producing blow is the *outward and upward* (not the downward and inward) motion of the wings (figure 96)! During about half of a given performance the wing-beats are separated by quite appreciable intervals, and for at least so much of the drumming the foregoing explanation particularly holds; then the strokes come so close together that the sound of each merges with the next to produce the whirring of the "muffled drum" (figure 97). No doubt this latter part of the drumming is caused about equally by the upward and the downward movements of the wings, the drummer's equilibrium being main-

tained by the one motion offsetting the next. Thus a rowboat will remain in one place if the oarsman attempts to row forward and backward, alternately, without turning his oars or raising them from the water. On first thought one might well doubt that a grouse or any other bird could *extend* its wings with sufficient force to produce a "thump" on the air audible for several hundred feet and even several hundred yards. I was so strongly inclined to this doubt that the bare possibility of the thing was a long while in occurring to me at all! Yet, seeing the feat actually accomplished over and over again, I now know it to be a fact. Note, however, in this connection, the force with which domestic pigeons and certain other birds strike their outward blows with their wings in fighting.

I believe I am fully prepared to state that the drumming is caused by the wings striking the air, alone. Whatever part in the sound may be taken by any other part of the bird than his wings must be very slight and merely incidental. In support of this statement attention is directed to the accompanying photographs with their explanations. The stiff primaries give forth the loudest part of the sound; the soft innermost secondaries, the least. The entire "thump" of each wing-beat is simply the total sound from all the wing feathers heard in unison. All bird students of any considerable experience, and hundreds of others, have occasionally seen a bird suddenly flash out its wings on the impulse of some alarm, the sound produced by this action sometimes being audible for several yards. The motion in this gesture is about the same as that of the drumming Grouse. Even in the silence with which the frightened bird brings its wings back to rest, upon finding the alarm was false, there is a likeness to the case of the Grouse. After the outward and upward motion in each beat, as long as the eye can clearly follow these the wings seem almost to fall of themselves or to rebound from the impact on the air in the upward stroke, then hang limp from the bend of the wing, often with a quite perceptible pendulum motion, until the next upward flash (figure 98).

When about to drum the Grouse usually sets his feet carefully as a man does in preparation for a standing broad jump (figure 99). But first the bird is likely to turn around completely once or twice as if bent on trying a new direction (figures 100, 101). Grouse No. 1, for example, had the habit of frequently doing so, always ending up quite comically by facing the same old way when he began to drum. That is the rule almost without exception; each drumming log is a one-way affair in that respect. For instance, logs No. 1 and 2 pointed in the same direction; yet the Grouse always faced west on number 1 and east on number 2 when drumming (figures 102, 103). The turning around reminds one of the similar acts of dogs before finally lying down just where they started.

Now, with the first preliminary wing-beat, the body of the drummer snaps into a more upright pose, the neck and chin feathers



Fig. 99. When about to drum the Grouse usually sets his feet carefully. Note the movement of the bird's left foot; the motions suggest a cat "making bread."



Fig. 100. The bird is likely to turn around once or twice, as if bent on trying a new direction — which he *wont!*



Fig. 101. Turning around before drumming. Although the Grouse seem to "consider" facing a different direction to drum, they customarily face the same way on any given log.



Fig. 102. The drumming now begins in earnest, following the first slow, almost noiseless strokes. This Grouse always faced west on Log No. 1, when drumming.

are greatly expanded and the bird peers straight ahead absorbedly (figure 104). The performer first tries his drum-sticks before each and every exhibition! The first one or two of these wing-beats may be quite inaudible even at a distance of only ten or twelve feet, but with the next few succeeding strokes the proper volume is attained, — the instrument is, so to speak, brought into tune,— then follows a short second's pause before the drumming begins in earnest (figure 105). Those first beats appear to be partly to reassure the bird that he has plenty of elbow room. It struck me as very much the sort of thing that a man does when he extends his arms a couple of times before he carves a roast or pitches a horseshoe. In fact I have once or twice detected an interrupted motion of the wings at this stage; there seemed to be a twig in the way or else something wrong with the overlapping of the wing feathers; — again the suggestion of a man giving his arms an extra twitch to adjust an interfering cuff or sleeve before proceeding seriously with the business in hand. This brings us to another point; the drumming is quite voluntary and under the bird's control, although the contrary has been suggested. Many times have I seen the drummer pause abruptly in mid-action and "register alarm" until the dog or hawk or other cause of disturbance had passed on. In approaching the drummers under entirely natural conditions the stalker will find them sufficiently keen to hear and see! Apparently they are alive to the fact that their drumming is an advertisement of their whereabouts to enemies as well as others. However, their manifest alertness notwithstanding, they are perforce rather deaf to ordinary footfalls during the brief accelerated frenzy with which the drumming ends. This is the part of the performance for which I early learned to wait while stalking the Grouse without the aid of a blind, or when approaching a blind to which no pathway had been cleared. They are all alert once more as the drumming ends, and pause as though listening for the response or echo (figure 121).

The drumming sound has been too often described to need a lengthy description here. It can be well summed up as a series of dull thumps or "thum"-s, continuing for about a quarter-minute; and while at first separated distinctly (figures 96, 102), they gradually and steadily become closer together until they merge in a spasmodic burst of fluttering as the drumming ends (figure 106). Considered by itself, any one of the drummings is very much the same as a hundred others; the variations are difficult to detect; certainly there seems to be rather less individuality than for example in the songs of Robins, Orioles or Song Sparrows.

Everyone familiar with the sound has noticed its ventriloquial quality that makes the whereabouts of the hidden drummer difficult to determine, as to both distance and direction. However, as I found out early in my experience, there is one point at which the sound always loses its ventriloquial disguise if the hearer be sufficiently near. In that diminutive tornado previously referred to, with which the drumming ends, the element of elusiveness seems to be wanting. The contrast between this final wild fluttering and the

vagueness of the preceding wing-beats is striking. Often, too, it brings quite a surprise to the listener, suddenly revealing that the bird he had fancied some two hundred yards or more away is in fact not a quarter of that distance and in a decidedly different direction than he had supposed.

Like the singing of other birds, the drumming of the grouse is most frequent and regular near sunrise and sunset. At these times the drummer will often remain on the log for an hour or more. It is more usual, however, for him to leave the log and walk about feeding near by at intervals of ten or fifteen minutes. On the latter occasions he is soon back again, looking very trim and well-groomed and alert as he hops to the top of the log (figure 107).

New Facts About the Habit. There follows a summary of the observed points for which I have been unable to find previous authority among writers on drumming Grouse. But perhaps this statement needs qualification as regards the striking of the air being almost or quite the sole cause of the sound;—I believe this point has been heretofore largely a matter of assumption, when it has been stated at all.

1. The outward and upward motion is chiefly responsible for the drumming sound, particularly during the first half of the performance, the inward and forward motion of the wings being for the most part silent, or nearly so.

2. The striking of the air alone with the wings is practically the sole cause of the sound.

3. The fluttering with which the drumming ends is devoid of the ventriloquism which marks the preceding part of the performance.

4. Frequently the grouse turns round and round like a dog before beginning to drum, and almost invariably faces in the same direction when drumming on any given log.

Methods In Watching and Photographing Drumming Grouse. My systematic observations in 1921 began on April 9 and ended on June 8. For that period two grouse in particular were under observation almost daily, each for from one to four hours and more at a time. The locality was about two miles from Brownville in Jefferson county, New York. I established my headquarters, a small tent shelter (figure 108), a few hundred feet from the drumming logs which I discovered were being used regularly. This tent was of canvas, about six feet long, and painted dull green. In it I spent many nights so as to be within easy hearing of the grouse at all hours. One of these drummers used about equally two logs approximately two hundred feet apart. The other bird used only one log with any regularity, but did occasionally drum from one or another log or stump from fifty to a hundred feet from his favorite station. Near each regularly used drumming place, as it was found, I improvised a blind or hiding place. Using in each case some nearby stump or tree as a nucleus, I first built up a wall having a peephole commanding the drumming log, and then added the sides as necessary. Blinds number 2 and 3 had neither



Fig. 103. The same Grouse faced east on log No. 2 when drumming. The picture shows him about to begin the performance.



Fig. 104. With the first preliminary wing-beat the body of the drummer snaps into a more upright pose. Note the characteristic lifting of the neck feathers at this stage.



Fig. 105. Pausing, as if listening for the response or echo. The drumming has just ended.



Fig. 106. The drumming has just ended. Note the "mussed up" appearance of the bird, and the tail as it is characteristically raised at this juncture.

top nor back (figures 109, 110). Number 1 was a brush hut shaped like an Esquimo house, and therefore was so conspicuous that the grouse avoided the nearby log for several days. During the interval this grouse had established himself on a log some two hundred feet away. Near the latter log, profiting by the failure of my former venture, I made for a blind only a breastwork of brush, bark and dead leaves; low sides were added a day or two later. This blind was begun about 11 a. m., on April 9. Four hours later I was peering through the peephole at the grouse which had been drumming at four-minute intervals for some twenty minutes.

From blinds number 1 and 2, I repeatedly heard distant drumming. Upon investigation I flushed a grouse from his drumming log about one hundred fifty yards away and beyond a clearing in the wood. Here I at once proceeded to make blind No. 3. For this one I used as a base a convenient old pine stump (figure 110). The stump was first torn open, then hollowed out and spread apart and somewhat patched with bark and dead leaves; a peephole next cut through the side of the stump needed no camouflaging to pass for a Woodpecker hole.

Each blind was approached from the rear by a narrow path cleared of all brush, dry leaves, twigs and branches for a distance of fifty or sixty feet. This arrangement enabled me to go to and from the blinds unseen and unheard while the grouse were on their logs. One of the drummers would discover me only when he chanced to walk from the log and stroll well around toward my rear. This happened several times. By crouching low I sometimes escaped being seen; and the grouse, after feeding awhile, would return unalarmed to the log. But again, crouch as low as I might, the reiterated "preent, preent" of his alarm call told me I had been detected and that the game was up for that half day. To shield my movements in going and coming the peephole of each blind was provided with a small curtain of dark cloth tacked along its upper edge to the inside of the blind. The glint of the camera lens was shaded by a tube of black paper fitted over the lens mounting. At first it was necessary to be quite careful to muffle the various "clicks" of my graflex camera, this being done by holding a handkerchief or a folded shirt over the adjusting keys when setting and releasing them.

At log No. 3, the usual distance from camera lens to the bird was slightly under eleven feet, or about four feet less than at log No. 1, and six feet less than at No. 2. At this log No. 3 my first snapshot was made between wing-beats as the drumming began, but it alarmed the bird (figure 111). At the fall of the shutter curtain my subject bounded up with a loud whir into a nearby tree. In fifteen or twenty minutes I heard him fly to the ground and he soon appeared on the drumming log gingerly walking to the drumming spot. Here I got in a dozen shots at him within the next hour, having contrived to deaden the noise of the falling shutter; still the sound was certainly loud enough to be audible at several times the distance. After the first few weeks neither of these birds showed

any special alarm over the operation of the camera. Whether bark of squirrel, rustle of scampering chipmunk, cry of Blue Jay, fall of shutter curtain — each was merely an occasion for the same inquiring stare, soon to be forgotten in the interest awakened by the next small wood noise (figure 112). Before my season with these drummers was over I had removed the paper tube from my lens and was no longer so cautious about muffling the clicks of the camera or the noise of changing film rolls. For the latter operation I had at first retired to a distance of a hundred feet in the rear of the blind. Toward the last the loading and unloading was done inside the blinds, often within eleven feet of the grouse.

For the first few weeks Grouse No. 1 kept me waiting for many an hour at one or the other of his two logs. He had a provoking way of shifting his base of operations just about the time I would get nicely ensconced at either log, and he might not reappear for the remainder of that half day. One day a happy thought came to me after listening for some time to the drumming which had been coming with provoking regularity and persistence from log No. 1, I being at No. 2. Doubling up my fist and using the bare ground in my blind for a drumhead, I beat an imitation of the sound; silence, intense, for about three minutes; then my friend hopped upon the log before me and appeared to look around for a supposed usurper of his throne (figure 113). In another minute or two he drummed; — he had decided to remain. That was not the last time the trick was worked successfully. Just what chord in Grouse psychology the ruse plays upon I am not sure; perhaps it is purely a sense of proprietorship, identical with that so common to breeding birds generally, over a more or less definite and restricted section of their home woods.

Experiences In a Grouse Blind. It must not be inferred from the uniformity of the drumming itself that the hours spent in a blind beside a drumming log are wholly monotonous. Indeed, the very wildness and seclusion of any spot implied by a drumming log constitute assurance that the grouse will not be one's only caller. Among the incidents tending to relieve the tedium of waiting between acts are the visits of many birds as well as squirrels, chipmunks and wood mice. Many times have I seen both red squirrels and chipmunks use the drumming log for their highway. Usually the grouse would politely hop to the ground to let the four-foot pass; again, not infrequently, with half-raised tail, expanded wings, and with head bent partly down in a mildly threatening attitude, the bird stood his ground and the squirrel was obliged to detour. Both grouse were fond of bugs or other similar wild-life victims. It was interesting to see them spring down, as they frequently did, in pursuit of one of these "small deer" on the ground near by. Grouse No. 1 in particular was quite surprisingly adept in this hunting, suggesting even a vireo or a warbler by the speed and grace with which he would dart from his log and snap up some small passing bug or other. The following are a few sample pages from my note-book.



Fig. 107. After an interval of feeding, he is soon back again looking very trim and alert as he hops to the top of the log.



Fig. 108. Headquarters of the author in 1921 while studying drumming Grouse. The tent is of canvas, painted dull green, and about 6 feet long.



Fig. 109. Blind No. 2 as seen from the rear. A breastwork of brush, pine boughs and birch bark.



Fig. 110. Blind No. 3 from the rear. An old stump hollowed out and remodeled as a screen for photographing and studying Grouse.

"May 1st.—Made 15 snapshots of grouse from blind No. 1 while watching him for one and a half hours about noon. Until about 11:00 or 11:30 A. M. it rained gently by spells with no direct sunshine between, then the sun shone for brief periods for an hour or two. Until about 11:30 hardly a grouse was heard; then the drumming began, apparently in two or three places, within hearing from my tent two hundred fifty feet from blind No. 1, and it continued with the usual regularity at the latter station until I left the thicket entirely or at least beyond hearing distance of the log. From about 11:00 to 12:30 I watched the grouse, the rain having stopped. His actions were as usual except that he seemed as peevish as a wet hen over his dampened feathers, shaking himself vigorously a few times and preening [see figure 114]. Once he left the log and soon I heard him shaking himself, apparently close to the blind and directly in front of it. When a dog barked and yelped and came rushing along until probably about two hundred feet from the log the Grouse was quite alarmed and started a few times as if to leave the log; then the dog as loudly and rapidly retreated, whereupon the grouse at once "registered" false alarm and drummed [see figure 115], the dog still barking one hundred and fifty yards away. This is the blind I entered a few days ago, alarming the grouse before I could reach the peephole, and thereupon he had flown to the lower branches of a cedar above the log, twitched his tail characteristically while for several minutes he sounded his note of alarm, then hopped to the ground and disappeared. Then I had fixed up the blind inside and out with a screen of cedar boughs. Evidently I was better hidden today than heretofore; twice today I changed film rolls in the blind, the Grouse being on the log. Last night I heard warblers in the thicket and saw one or two Black-throated Greens. White-throated Sparrows sang at dawn this morning. Robins have all along been numerous in the thicket, with several Purple Finches and an occasional flock of Cedar Waxwings. Blue Jays and Chickadees are numerous here. Field Sparrows are numerous in the surrounding clearings."

"May 5th.—For the first time I saw a grouse actually strutting, tail raised and fully spread, chest expanded, crest raised [see figure 116]. This was Grouse No. 2. The bird had stopped in the midst of drumming; when I looked out to see the cause he was in this strutting attitude and walked a foot or two back and forth, turning round slowly a few times. His attitude suggested a spectator in the form of a mate, but I saw nothing of the latter. His alert and watchful mien was different from a turkey gobbler's self-engrossed manner. He drummed rather briefly once or twice in the strutting attitude, with tail raised and expanded throughout the act. After strutting two or three minutes he soon left the log."

Much has been said and written about the "lordly strutting, like a proud turkey cock" of the male Ruffed Grouse. My own observations, however, seem to indicate that the strutting is far less common than reported and that it is rather more a matter of attitude than action; in particular, that it is *not* like the blustering strut of the

proud turkey cock but, on the contrary, marked by silence and watchfulness. Of the eight or ten Grouse I have watched for hours at a time, daily, covering altogether the entire breeding season, only one—as above noted—showed any sign of strutting and then only on one or two occasions for a few brief minutes (figure 117). However, I fancy the strutting is mostly done in the presence of the female, or at least when her presence is suspected,—that it is essentially a *mating* habit, and hence is most commonly practiced very early in the spring; earlier than most of my observations have thus far been made.

“May 14th.—Made several snaps of the grouse from blind No. 3. Here a Black and White Warbler visited me, coming within a yard of my face; then he went round to the front of the blind and viewed me through the peephole. I have seen both grouse run suddenly off their logs after some bug or fly, then walk leisurely back. Grouse No. 2 seems crop-bound or to have some such ailment; today he repeatedly acted so. I watched him from 7:30 till noon when he left the log and I soon heard him clucking loudly and continuously—I think for a mate—some 60 feet to my left, in which direction he had disappeared.”

“June 1st.—Flushed Grouse from beside log No. 1. No drumming heard or other Grouse seen.”

“June 8th.—Flushed Grouse from beside log No. 1. Watched No. 2 drum a few times.”

A Tragedy of the Woods. This bird No. 2 continued to show evidence of sickness, persisting in moping and dozing. After drumming he would lapse almost immediately into a sleeping posture, often half closing or even entirely closing his eyes drowsily. Shortly before his next drumming he would come out of his stupor (figure 118); the drumming seemed to be a duty that had to be gone through with. I greatly feared some marauder would get him.

By this time (June 8) the drumming had become irregular and undependable. Stripping my blinds of the cloth curtains over their peepholes and carefully measuring the respective distances from blinds to drumming logs, I “called it a season.” Yet one grim note remained to be added.

About the middle of June, finding myself again in the Grouse woods, I visited the drumming logs once more. Nos. 1 and 2 had been in recent use. No. 3 had apparently been unused for several days, and the reason was not far to seek. A few small body feathers, which strewed the spot, were no cause for alarm; such feathers are not at all unusual in these places where the grouse do a good deal of preening (figure 119). But here also was a tuft of black feathers from the ruff! I was suspicious. Almost at the same time I discovered one of the flight feathers, then several others, all on the ground within a few feet of the drumming spot. Of course that settled it; here were the very drumsticks, wrenched and thrown away! *Bonasa*, afflicted as I noticed he had been, had dozed once too often or a moment too long and, in consequence,



Fig. 111. A drumming Grouse interrupted and alarmed by the click of the camera during a performance.



Fig. 112. After a time the noise of the camera shutter was regarded only with an inquiring stare, and soon forgotten in the interest awakened by the next small wood-noise,



Fig. 113. Deceived by the ruse of thumping on the ground, the Grouse hopped upon the log and appeared to look around for the supposed usurper of his throne.



Fig. 114. On a rainy day. The drummer seemed as peevish as a wet hen, shaking himself vigorously and preening.

had met the fate I had feared for him. Evidently he had not seen the fox or bird of prey until it had actually pounced on him. As to whether or not he has left some lusty heir to inherit his well-worn log I can not now tell for certain. However, another year has nearly rolled around. It is drumming-time again. For a week or more logs Nos. 1 and 2 have again been in use. But there is as yet no drummer on log No. 3.

Why the Grouse Drums. Now, why does the Ruffed Grouse drum? What does the drumming mean? I believe with those who think the drumming closely corresponds to the singing of other birds,—that it is just as much, and no more, a nuptial performance. Although heard occasionally at various times throughout the year, it chiefly coincides with the mating and nesting season. Through August, when song birds are particularly silent and retiring, there is almost no drumming to be heard in the woods. As autumn comes on the drumming breaks out again; so does the singing of orioles, vireos, sparrows and various other birds which regularly have a post-nuptial song season. But I have rarely heard a grouse drum in winter. At any rate the broad fact remains; springtime, mating time, nesting time—is the time of the male bird chorus and the time when the cock grouse drums with daily regularity and hour-long persistence. The bloodroot, hepatica, anemone and trillium, now blooming, form the proper setting for the drumming log (figure 120). The time of these flowers is the time of the birds' spring choral. And how lacking would be the concert without that strangely haunting, bewitching sound,—the most potent in all nature to revivify a thousand memories of our woods in spring,—the muffled drum of the Ruffed Grouse!

The Human Appeal of the Drumming. It is early in April that this new voice of the woods begins to be regularly heard. To those who have long been familiar with the sound it means the babbling of trout streams, the drowsy humming of the earliest bees, hawks tracing out anew their circles in the sky, and a hundred like signs of the season. Other birds may come to you with their songs; often they come at unexpected and inauspicious times and places. To hear the Ruffed Grouse beat his "muffled drum" you must visit the stilly wood where he has secluded himself (figure 122). So it is that every charm which goes to make up the typical springtime woods comes crowding back with overpowering associations whenever the initiated hear again that magic sound;—the seclusion, the still air, the gentle rustle more potent than silence for rest and "pleasure in the pathless woods"; the dry leaves turned by growing green things; the calm, the serenity of it all; and then the drum, "thum — thum — thum — thm — thm — thm-thm-m-m-m-m-m-m-mmmmm"; the drum that beats for peace! Listen to that exhilarating tattoo; listen to that echo of your own throbbing heart.

NESTING OF THE RUFFED GROUSE

The Nest and Eggs. All the nests I have found of the Ruffed Grouse have been in dry parts of the woods. Most of them were built close beside a log or at the base of a sizeable tree; a few were sheltered only by fallen brush or branches. In every case the nest itself was well hollowed and well lined with dry leaves or pine needles.

The eggs are of a clouded or dusky cream color, usually more or less freckled with small spots a few shades darker. With two exceptions, the nests I have found contained from 8 to 13 eggs. One nest was found when only the first egg had been laid.

On May 14, 1922, near Blossvale, N. Y., I made quite a different but not less remarkable find. Upon discovering a sitting grouse on May 13, I had stolen away without flushing her. The next day I took along two children who were bird enthusiasts to share the sight, little thinking what a rare spectacle was in store for us. The sitting grouse was only slightly screened by a thin lattice of brush and the nest was so close to the base of a tree that the tail of the sitter touched the bark,—a typical location. At a distance of twenty feet we stood admiring the picture. One, two, three minutes she sat, her large eyes turned on us, as motionless throughout as any statue in bronze. Then she suddenly and noisily rushed from the nest a distance of a foot or two and sprang into the air with a vigor and noise of flying leaves that was remarkable even in a grouse. (This manner of departure is so frequent an occurrence that I am satisfied it is not wholly by accident that the eggs are commonly strewn with leaves. I remember one nest which had been thus completely covered over with leaves, and entirely hidden, although I had just flushed the sitting bird.) We hastened to look into the nest. A leaf or two had been fanned onto the eggs. The latter formed a single saucer-shaped layer more than covering the bottom of the leaf-lined hollow. One, two, three—we counted; thirteen, sixteen! twenty!!—the largest clutch I have ever seen.

On May 28 the grouse was still sitting; the eggs were unhatched. On June 2 the nest had only empty shells and two unhatched eggs. The shells were mostly in two pieces only. A systematic search through the woods failed to disclose the brood; they had evidently gone at least 150 yards from the nest.

Making Friends With a Ruffed Grouse Chick. On May 28, I found, one hundred yards from the nest of twenty eggs just mentioned, an old grouse and her brood of two or three days old. Employing the hiding and calling tactics described elsewhere in this paper, two of the young were caught. One was taken from the woods and photographed in the hands of my daughter (figure 121). Two hours later we brought it back to the woods, where, after feeding it several flies and other insects, we let it go free. Then came the big surprise. Instead of running away into hiding it at once began to follow us, puppy-like, stopping when we stopped, soon finding and catching up to us if we hurried ahead. When we sat



Fig. 115. Just after the drumming. The tail still raised, but gradually falling back to normal.



Fig. 116. Strutting. In this case the bird stopped in the midst of drumming, assumed this strutting attitude, and walked a foot or two back and forth.



Fig. 117. Beginning to strut. Only one Grouse showed any sign of strutting, and then only for a few minutes at a time.



Fig. 118. Bird No. 2 continued to show evidence of sickness. Before his next drumming he would come out of his stupor, then relapse into drowsiness.

down it went round and round us trying to squeeze under us. It also climbed to my daughter's head where, peeping with a new note of content, it wriggled quickly under her bobbed hair. Its ability to pick its way surely and rapidly over, under or through the obstructions of brush, logs, tussocks and shoots and then to locate us was truly marvelous. Observing that it already could and did now and then pick up a fly on its own account, we felt assured that it could make its own way in the world and left it to do so or else find its brothers and sisters.

On June 4 I had another meeting with a young grouse chick which may have been a real sequel to the foregoing. With a boy of fifteen I was crossing an open field some three hundred yards from the spot where the grouse chick had been let go seven days before. Here we very unexpectedly came upon a young grouse about one week older than the other chick. This field adjoined the same piece of woods. There was no sign of any other grouse, young or old, about. Under these extremely exceptional circumstances it seemed unavoidable to infer that here was my little acquaintance of the preceding week. Apparently he had wandered to this place where, by the way, small grasshoppers seemed to be abundant, through having no guiding parent to keep him in his natural habitat. He was about as wild as a domestic chick of the same age. He would struggle to escape, and did escape, from my hand; but, when I offered him flies and grasshoppers, although he did not take them, he would sit very still as if some dim recollection had come to him. I soon let him go, but I believe he would have eaten from my hand within an hour or two.

FAMILY LIFE IN SUMMER

For the element of human interest summer is perhaps the season which will best repay the field observer of the Ruffed Grouse. But it is not now the bird of thundering wing, or beating the mysterious drum, about which interest centers. The point of focus now is the brood of charming young with their watchful, crafty, resourceful mother.

Many, many times have I heard some hunter or backwoodsman telling the old, old story of the chicks disappearing as if by magic and then of the "cute little rascals" being found, *each one on his back, holding a leaf over him!* Repeatedly have I tried to verify the story by experience, but always in vain. The tale is a myth. Again and again I have come across the anxious mother and have always looked for the young. My method is to let the fluttering bird lead me a short distance away, then make a sudden sprint at her, forcing her to take wing to a considerably greater distance; whereupon I at once hasten back with all speed to the place of our first meeting, here to conceal myself as best I may. There follows perhaps ten minutes of silence. Then comes a low, mewing note, "pe-e-e-e-u-u-r-r-r." The note can be imitated by trying to pronounce the word "pure" in a strained, tremulous way with the

mouth nearly closed. Soon there is an entirely different note like the low clucking of a hen or turkey; this grows louder and more confident and I catch a glimpse now and then of the watchful hen picking her cautious way back among the low plants. "Tsee—tsee—tsee-e-e-e," answers a chick here and there about me, all unseen. "Puk-puk-puk," from the mother; "tsee-tsee-tsee-e-e-e," from the chicks, and one of the latter comes flying down from some leafy, lower branch; "tsee-tsee-tsee"—and another appears from around a stump or log. There follows more calling back and forth, more chicks come out of hiding and already the "puk-puk-puks" have begun to grow faint in the distance as the mother quickly leads the brood off under cover of the ferns. I have on two or more occasions discovered one of the chicks in his hiding place on the leafy ground. In each case he was merely squatting there, his coat of mottled down perfectly matching the browns and grays of the forest floor.

By the last of June the young are the size of the Bob-white or Quail. From about this time onward through the summer a favorite pastime, if not a necessity with these birds, is dust-bathing. The mother or one of her brood, alone, may be the bather; again, the entire family may indulge. It is seldom that the observer is so fortunate as to discover the birds in this interesting act. But the recently vacated dusting spot is full of keen interest for the reader of the sign language of the woods. The bath may be a certain sunny spot on some logging road or at the edge of a clearing; again, it may be a crumbling, dry, old log along which the whole family has ranged itself, each member in his own individual wallow.

All summer long the family holds together, growing fat and lusty on insects and berries. The father, however, seems to drop out of sight after the drumming season. His presence with the family in summer seems to be only casual. The accompanying plate, therefore, shows a scene more ideal than average (plate 29). I have now and then flushed the whole covey even in autumn. I believe this is the normal condition and that it is chiefly because of their being broken up and scattered by shooters and their dogs, or other enemies, that more coveys are not found intact as late as November at least.

LIFE OF THE RUFFED GROUSE IN WINTER

The regular winter diet of the Ruffed Grouse consists of the buds of various trees; birch and poplar are favorites, and occasionally he visits an apple orchard. Hence the winter and very late autumn are known as the "budding" season. The budding birds must be pretty watchful and quick to take cover in the undergrowth, for I confess I have very seldom been able to surprise them in the upper branches where no doubt they often feed. Still, they prefer the ground. Their tracks are always to be expected about heaps of newly-cut brush. They like to follow the axeman and snip the buds of trees he has brought low.



Fig. 119. Preening. Note the outer tail-feather which the camera caught before it snapped back entirely after its release from the bird's bill.



Fig. 120. A drumming log in June — toward the last of the regular drumming season.



Fig. 121. A confiding Ruffed Grouse, only a few days old.



Fig. 122. Deep in the forest. To hear the "muffled drum" you must visit the stilly wood where the drummer has secluded himself.

More interesting than his winter feeding is the winter sleeping quarters of the Ruffed Grouse. Where the snow is deep and soft he commonly burrows or dives into it for the night. More snow may fall before morning, and often the Grouse finds himself covered a foot deep. Now and then a crust may form on the surface and so imprison him seriously. In some regions where in certain years the total number of Grouse has been greatly reduced this has been the alleged cause. Personally, I find but slight ground for this explanation and I believe it must be a very rare occurrence on such a scale.

THE KING OF GAME BIRDS

Full of interest as is the Grouse to the lover of nature and of birds in particular, he is perhaps most widely known and most familiar to sportsmen. In all the eastern states this is by far the most important land game bird. The Bob-white, where he occurs, may share the sportsman's attention; but the Grouse is more universally distributed than the Quail. Doubtless there are those who would say the Pheasant divides honors with the Ruffed Grouse as a game bird, or even that the former is the finer and more desirable bird. The Pheasant is a foreigner, an involuntary immigrant. His colors are the extravagant hues of the Orient. His flight is comparatively slow and labored and his haunts are not preferably and characteristically the woods; rather, they are the relatively open places. These conditions, taken together with his large size, render the Pheasant an easy target and his pursuit a tame sport. How different is the Ruffed Grouse! This hardy native American must be sought in the deep woods. Here he is so much at home that the successful hunter must be pretty much of a woodsman himself. Most hunters employ a dog to find and detain the birds; many shooters would not consider it at all practicable to hunt Grouse otherwise; they regard the dog as no less indispensable than the gun. However, it is only by hunting them without the aid of a dog that one comes to fully appreciate their wiliness and resourcefulness. It should be borne in mind that even in such hunting the game is heavily handicapped. The hunter is armed with that finished engine of destruction, the modern breech-loading shotgun, while the Grouse must depend wholly on his wits and speed. Where is the hunter who would even attempt to match *Bonasa* on even terms!

It is several years since the writer abandoned his gun altogether in favor of the camera and sketch book. And now there is little enough satisfaction in the reflection that that gun shot many a Grouse, albeit all of them on the wing and not one over a dog. I have, after all, never taken a Grouse except through the immense advantage of my infernal powder and lead. I never outwitted him fairly; I have never held his limp form in my hand without feeling the rebuke of those matchless wings. I found no just ground to glory over the dead body of that perfect product of the wild out-

doors, that past master of woodcraft with his wings which so immeasurably outmatched the best my limbs could do; those wings with their damning, rebuking evidence — a drop of lead-tinctured blood. The triumph was all his.

LIST OF REFERENCES

ALLEN, A. A.

1918. Upland Game Birds: The Grouse. *Amer. Forestry*, Vol. 24, pp. 497-501.

HODGE, CLIFTON F.

1905. Drumming of the Grouse. *Country Calendar*, Vol. 1, No. 7, pp. 640-644.

SAWYER, EDMUND J.

1908. The Drumming of the Ruffed Grouse. *Bird-Lore*, Vol. 10, pp. 246-249.

TUTTLE, H. E.

1919. Some Notes on the Drumming of the Ruffed Grouse. *The Auk*, Vol. 36, pp. 325-339.

1920. Spring Thunder. *Bird-Lore*, Vol. 22, pp. 139-142.

VREELAND, FREDERICK K.

1918. The Drumming of the Ruffed Grouse. *Forest and Stream*, Vol. 88, pp. 199-201, 244.

- 1918a. How a Ruffed Grouse Drums. *Bull. Amer. Game Protective Assoc.*, Vol. 7, pp. 12-14.

CURRENT STATION NOTES

THE ALLEGANY PARK BIRD SURVEY

The role which the Roosevelt Station played in the establishment of the Allegany State Park was briefly outlined in the first number of the *Bulletin*. In this number is published the first detailed report of the cooperative wild life survey which has been made with the Allegany State Park Commissioners. The paper by Mr. Saunders is the first inventory of the animals of that region; and in behalf of the Station I wish to express my appreciation for the generous assistance of the Commissioners. Reports on other aspects of the survey will be published in due time.

COOPERATION WITH THE ALLEGANY STATE PARK

As mentioned above, the first number of the *Bulletin* (pp. 62-63) contains a statement of the relation of the Roosevelt Station to the original plan which resulted in the establishment of the Allegany State Park, near Salamanca, New York. The "First Annual Report of the Commissioners of the Allegany State Park" (Legislative Document, 1922, No. 95, pp. 1-98; cf. also, for an abstract, *Hobbies*, Buffalo Society of Natural Sciences, Vol. 2, No. 9, pp. 3-25, and separate, pp. 1-24), contains in addition to the report of the Commissioners two appendices of especial interest, one by Mr. Edward F. Brown, on a general survey of the Park area, including much of the paper by the Director, published in the *Bulletin* on pp. 62-74, on the plans for wild life of this Park, and a second paper by Professor Henry R. Francis, on the recreational resources of the Park. This report, and an earlier paper by P. M. Silloway and Edward F. Brown on the Palisades Interstate Park (Bull. No. 10, New York State College of Forestry), are of particular interest to persons concerned with the recreational and wild life uses of public forest lands.

Not only has the Roosevelt Station been interested in the Allegany Park since its inception, but also it has devoted two seasons of field studies to its problems. In addition to this, it was through the Station that the Commissioners of this Park were put in direct contact with the Washington authorities in charge of war supplies, from whom the Commissioners have secured about \$300,000.00 worth of equipment for the Park, including auto trucks, canvas for tents and much other equipment which has enabled the Park authorities to accommodate the public while its appropriations are yet small.

THE RUFFED GROUSE

The Ruffed Grouse is the most popular game bird in Eastern America. It abounds in the Allegany State Park, and should prosper there under proper care and become both for the sportsmen and for the general public one of its most interesting attractions. The observations begun by Mr. Saunders will be extended in order

to learn by what system of forest and game management this bird may be best encouraged.

The interesting paper and very valuable series of photographs of the Ruffed Grouse in this number of the *Bulletin*, by the well-known bird artist and student, Mr. Edmund J. Sawyer, will be appreciated by many. This valuable contribution to the Roosevelt Station has been made possible through the generosity of several friends, including Mr. J. C. Brennan, Dr. Henry E. Bischoff of the Erie County Society for the Protection of Birds, Fish and Game, and Mr. W. E. Hookway of Syracuse; and plate 29 has been contributed by the author and artist himself. Attention is called to the fact that the colored plates accompanying Mr. Saunders' paper, as well as those in the following issue of the *Bulletin* (Vol. 1, No. 4) on the birds of the Adirondack forest, are the painstaking work of Mr. Sawyer.

NEW PROBLEMS IN FOREST RECREATION

That mosquito control, by means of fishes, should be a practical forestry problem will be a surprise to many who think of forests only in terms of lumber and not as related to other points of human contact. With the intensive use of forests that accompanies recreational utilization by large metropolitan crowds there arise new problems, far in advance of those in remote forests, that demand new methods of attack. While a fish survey was being conducted by the Roosevelt Station, with the view of learning how to properly stock and manage the waters of the Palisades Interstate Park, it was found that many campers were suffering from the bites of mosquitoes. A special examination of the breeding grounds showed that the mosquito larvae or wigglers thrived when out of reach along the shores among water vegetation or behind other barriers. It was also found that when fish had access to these retreats the wigglers did not abound in the water, but they were found abundantly in the stomachs of the fish. In this way and by other methods it was determined that certain kinds of the fish were very valuable in controlling the abundance of mosquitoes.

The plans for this investigation were initiated by Mr. Edward F. Brown, Superintendent of the Camp Department of the Palisades Interstate Park, and were conducted by Dr. J. Percy Moore, of the University of Pennsylvania, working in cooperation with the Commissioners of the Palisades Interstate Park, the U. S. Bureau of Fisheries, and the Roosevelt Wild Life Station. The results of this cooperative survey have been published by the U. S. Bureau of Fisheries in "Use of Fishes for Control of Mosquitoes in Northern Fresh Waters of the United States" (Report of the U. S. Commissioner of Fisheries for 1922, Appendix IV, pp. 1-60, Doc. No. 923, 1922). The cooperative character of this investigation might easily be overlooked, and it should be definitely understood that this was the direct outcome of the Station's cooperation with the Park. The author remarks that "of all the experiments made during the three seasons the most conclusive were those made in the Palisades (Interstate) Park" (l. c., p. 9).

THE ROOSEVELT WILD LIFE MEMORIAL

As a State Memorial

The State of New York is the trustee of this wild life Memorial to Theodore Roosevelt. The New York State College of Forestry at Syracuse is a State institution supported solely by State funds, and the Roosevelt Wild Life Forest Experiment Station is a part of this institution. The Trustees are State officials. A legislative mandate instructed them as follows:

"To establish and conduct an experimental station to be known as 'Roosevelt Wild Life Forest Experiment Station,' in which there shall be maintained records of the results of the experiments and investigations made and research work accomplished; also a library of works, publications, papers and data having to do with wild life, together with means for practical illustration and demonstration, which library shall, at all reasonable hours, be open to the public." [Laws of New York, chapter 536. Became a law May 10, 1919.]

As a General Memorial

While this Memorial Station was founded by New York State, its functions are not limited solely to the State. The Trustees are further authorized to cooperate with other agencies, so that the work is by no means limited to the boundaries of the State or by State funds. Provision for this has been made by the law as follows:

"To enter into any contract necessary or appropriate for carrying out any of the purposes or objects of the College, including such as shall involve cooperation with any person, corporation or association or any department of the government of the State of New York or of the United States in laboratory, experimental, investigative or research work, and the acceptance from such person, corporation, association, or department of the State or Federal government of gifts or contributions of money, expert service, labor, materials, apparatus, appliances or other property in connection therewith." [Laws of New York, chapter 42. Became a law March 7, 1918.]

By these laws the Empire State has made provision to conduct forest wild life research upon a comprehensive basis, and on a plan as broad as that approved by Theodore Roosevelt himself.

Form of Bequest to the Roosevelt Wild Life Memorial

I hereby give and bequeath to the Roosevelt Wild Life Forest Experiment Station of The New York State College of Forestry at Syracuse, for wild life research, library, and for publication, the sum of, or the following books, lands, etc.

MAP OF ALLEGANY STATE PARK

SHOWING OPEN AND FOREST AREAS

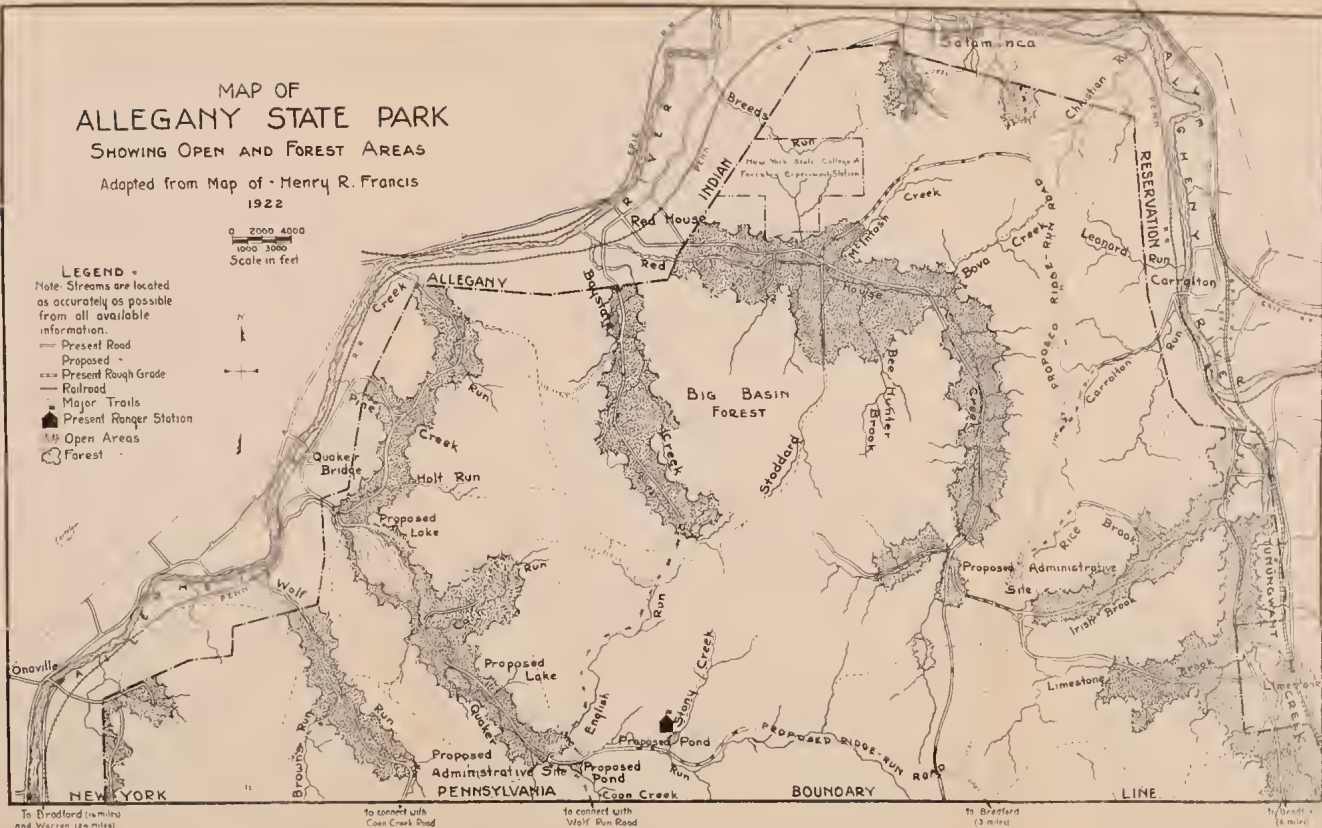
Adapted from Map of - Henry R. Francis
1922

0 2000 4000
1000 3000
Scale in feet

LEGEND -

Note: Streams are located as accurately as possible from all available information.

- Present Road
- - - Proposed
- - - Present Rough Grade
- Railroad
- Major Trails
- Present Ranger Station
- Open Areas
- Forest



To Bradford (16 miles)
and Warren (24 miles)

To connect with
Coon Creek Road

To connect with
Wolf Run Road

To Bradford
(3 miles)

To Bradford
(6 miles)

Map. 4. Allegany State Park, showing the open and forested areas

